

Nos. 20-1141, 20-1142, 20-1143, 20-1149, 20-1150, 20-1151

**United States Court of Appeals
for the Federal Circuit**

INTEX RECREATION CORP.

Appellant,

BESTWAY (USA), INC.,

Appellee

v.

TEAM WORLDWIDE CORPORATION

Cross-Appellant,

v.

KATHERINE K. VIDAL, Under Secretary of Commerce for Intellectual Property
and Director of the United States Patent and Trademark Office,

Intervenor

Appeal from the United States Patent and Trademark Office – Patent Trial and
Appeal Board in Nos. IPR2018-00870, IPR2018-00871, IPR2018-00872,
IPR2018-00873, and IPR2018-0074.

**APPELLANT’S OPENING BRIEF
NONCONFIDENTIAL VERSION**

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Claim at Issue (U.S. Patent No. 7,246,394)

1. An inflatable product including:

an inflatable body;

a ***housing built into the inflatable body***, the housing having an interior region; and

an ***air conduit disposed at least in part in the housing***, the air conduit being movable between a first position and a second position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;

wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.

APPELLANT'S CERTIFICATE OF INTEREST

Counsel for Appellant hereby certifies the following:

1. The full names of the parties represented by me is:

Intex Recreation Corp.

2. The name of the real party in interest (not identified in Question 3) represented by me is:

N/A.

3. All parent corporations and publicly held companies that own 10 percent or more of stock in the party:

Intex Recreation Corp. is a wholly-owned subsidiary of Intex Corp., a privately held company with no public entity owning any portion thereof.

4. The names of all law firms and the partners or associates that appeared for the party now represented by me at the Patent Trial and Appeal Board proceeding or are expected to appear in this Court (and who have not or will not enter an appearance in this case) are:

None.

5. The title and number of any case known to counsel to be pending in this or any other court or agency that will directly affect or be directly affected by this court's decision in the pending appeal:

***Intex Recreation Corp. v. Team Worldwide Corporation*, Case IPR2018-00859, was remanded to the Patent Trial and Appeal Board following an opinion from this Court vacating the Board's determination of non-obviousness in Federal Circuit appeal No. 20-1144. After remand, on April 15, 2022, the Board found all challenged claims unpatentable as obvious.**

***Intex Recreation Corp. v. Team Worldwide Corporation*, Case IPR2018-00875, subject to Federal Circuit appeal No. 20-1147.**

Team Worldwide Corporation v. Macy's, Inc. & Macys.com, LLC, No. 2:19-cv-00099-JRG (E.D. Tex.)

Team Worldwide Corporation v. Target Corporation and Target Brands, Inc., No. 2:19-cv-00100-JRG (E.D. Tex.)

Team Worldwide Corporation v. The Home Depot, Inc., No. 2:19-cv-00098-JRG (E.D. Tex.)

Team Worldwide Corporation v. Dick's Sporting Goods, Inc., No. 2:19-cv-00097-JRG (E.D. Tex.)

Team Worldwide Corporation v. Costco Wholesale Corporation, No. 2:19-cv-00096-JRG (E.D. Tex.)

Team Worldwide Corporation v. Bed Bath & Beyond, Inc., No. 2:19-cv-00095-JRG (E.D. Tex.)

Team Worldwide Corporation v. Amazon.com, Inc. and Amazon.com LLC, No. 2:19-cv-00094-JRG (E.D. Tex.)

Team Worldwide Corporation v. Ace Hardware Corporation, No. 2:19-cv-00093-JRG (E.D. Tex.)

Team Worldwide Corporation v. Academy, Ltd. d/b/a Academy Sports + Outdoors, No. 2:19-cv-00092-JRG (E.D. Tex.)

Team Worldwide Corporation v. Sears, Roebuck and Co., Sears Holdings Corporation, and Transform Holdco LLC, No. 2:20-cv-00006 (E.D. Tex.)

Dated: April 29, 2022

/s/ Bethany N. Mihalik
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CONFIDENTIAL MATERIAL OMITTED:

The material omitted in the addendum on pages Appx81, Appx82, Appx207, material omitted from lines 15, 16, and 20 of Appx84 and 13 and 17 of Appx210, pages Appx475, Appx476, and Appx478 indicates the dollar amount of product sales; material omitted from line 11 of Appx84 and line 8 of page Appx210 indicates a quantity of products sold; material omitted on pages Appx85, Appx86, lines 5-9 of Appx87, Appx211, Appx212, lines 2-6 of Appx213, Appx479, Appx480, and lines 9-13 of Appx481 describes factors affecting customers’ preferences between competing products, which are the results of confidential and competitive surveys; material omitted from lines 16 and 19 of Appx87, lines 13 and 16 of Appx213, and lines 20 and 23 of Appx481 indicates a percentage or ratio of product sales; material omitted from line 26 of Appx87, pages Appx88, Appx90, Appx91, lines 3-11 of Appx92, lines 23-25 of Appx213, page Appx217, lines 1 and 12-14 of Appx218, pages Appx219, Appx482, Appx486, and lines 9-17 of Appx487 describe findings from a confidential arbitration proceeding; material omitted from line 26 of Appx91, lines 1-2 of Appx92, lines 23-25 of Appx218, and lines 6-8 of Appx487 describe portions of a confidential settlement agreement; material omitted on pages Appx93, Appx220, and Appx488 indicates the dollar amount of alleged licensing revenue.

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STATEMENT OF RELATED CASES

Pursuant to Federal Circuit Rule 47.5, counsel for Appellant Intex Recreation Corp., provide as follows:

1. There has been no previous appeal in this case.
2. The patent at issue, the '394 Patent, is the subject of the following related and pending proceedings in the United States District Court for the Eastern District of Texas (collectively, the "EDTX Litigations"):

- *Team Worldwide Corporation v. Macy's, Inc. & Macys.com, LLC*, No. 2:19-cv-00099-JRG (E.D. Tex.);
- *Team Worldwide Corporation v. Target Corporation and Target Brands, Inc.*, No. 2:19-cv-00100-JRG (E.D. Tex.);
- *Team Worldwide Corporation v. The Home Depot, Inc.*, No. 2:19-cv-00098-JRG (E.D. Tex.);
- *Team Worldwide Corporation v. Dick's Sporting Goods, Inc.*, No. 2:19-cv-00097-JRG (E.D. Tex.);
- *Team Worldwide Corporation v. Costco Wholesale Corporation*, No. 2:19-cv-00096-JRG (E.D. Tex.);
- *Team Worldwide Corporation v. Bed Bath & Beyond, Inc.*, No. 2:19-cv-00095-JRG (E.D. Tex.);
- *Team Worldwide Corporation v. Amazon.com, Inc. and Amazon.com LLC*, No. 2:19-cv-00094-JRG (E.D. Tex.);
- *Team Worldwide Corporation v. Ace Hardware Corporation*, No. 2:19-cv-00093-JRG (E.D. Tex.);
- *Team Worldwide Corporation v. Academy, Ltd. d/b/a Academy Sports + Outdoors*, No. 2:19-cv-00092-JRG (E.D. Tex.);

- *Team Worldwide Corporation v. Sears, Roebuck and Co., Sears Holdings Corporation, and Transform Holdco LLC*, No. 2:20-cv-00006 (E.D. Tex.).

3. The EDTX Litigations also involve U.S. Patent No. 9,211,018 (the “’018 Patent”) and U.S. Patent No. 7,346,950 (the “’950 Patent”), which are directed to related technology.

- The Board found all challenged claims of the ’018 Patent to be patentable in IPR2018-00859. On June 21, 2021, this Court vacated the Board’s determination of non-obviousness and remanded “for further proceedings consistent with this opinion” in Case No. 20-1144. On April 15, 2022, the Board issued a Final Written Decision on Remand in IPR2018-00859 and found all challenged claims unpatentable as obvious.

- The Board found all challenged claims of the ’950 Patent to be unpatentable in IPR2018-00875. This decision is the subject of an appeal before this Court in Case No. 20-1147. Following a limited remand and denial of rehearing by the Director, TWW’s opening brief is due Friday, April 29, 2022.

STATEMENT OF JURISDICTION

The Patent Trial and Appeal Board (“Board”) had jurisdiction over the five *inter partes* review proceedings consolidated in the present appeal under 35 U.S.C. § 311 and entered Final Written Decisions as follows: (1) IPR2018-00870 (“the 870 Decision”); (2) IPR2018-00871 (“the 871 Decision”); (3) IPR2018-00872 (“the 872 Decision”); (4) IPR2018-00873 (“the 873 Decision”); and (5) IPR2018-00874 (“the 874 Decision”). On November 12, 2019, Appellant Intex timely appealed the 872 and 873 Decisions.¹ Cross-Appellant Team Worldwide Corporation (“TWW”) appealed the 870 and 874 Decisions, as well as portions of the 871 Decision. Following a limited remand to seek Director Review, the Board’s Final Written Decisions were adopted as the final decision of the agency on January 7, 2022. Accordingly, this Court has jurisdiction under 28 U.S.C. § 1295(a)(4)(A) and 35 U.S.C. §§ 141(c) & 319.

¹ In the Notice of Appeal, Intex also appealed portions of the 871 Decision. In the interest of narrowing the issues before the Court, however, Intex is not maintaining its challenge to the 871 Decision.

INTRODUCTION

This appeal consolidates challenges to five Final Written Decisions as to the '394 Patent, which is directed to inflatable products with “built in” electric pumps. (See Dkt. No. 2.) Although the Board ultimately—and correctly—held claims 1–12 and 16–23 (“the Challenged Claims”) invalid as unpatentable in the 870 and 874 Decisions and claims 1–3, 7–12, 16–18, and 22–23 invalid as unpatentable in the 871 Decision,² the Board overlooked additional grounds of unpatentability in the 872 and 873 Decisions. To be clear, however, if the Court affirms the unpatentability rulings in the 870 and/or 874 Decisions (which Intex respectfully submits is the correct outcome), this Court need not reach the additional grounds of unpatentability in the 872 and 873 Decisions.

The Board must provide parties in any *inter partes* review with fair notice and an opportunity to respond. See, e.g., *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1080 (Fed. Cir. 2015). In the 873 Decision, the Board procedurally erred by introducing and applying a new claim construction—not advocated by either party—for the first time in the Final Written Decision. Each of the Challenged Claims recite the limitation “pump housing ***built into*** an inflatable body.” At Institution, the Board preliminarily adopted the parties’ agreed construction of “integrated into and not detachable from”—language borrowed from the *Markman* order of a district court

² These Decisions are the subject of cross-appeals by TWW.

proceeding involving the '394 Patent. The Board, however, changed theories in the 873 Decision, when it interpreted the term to additionally require “at least some level of recess of the ‘housing’ into the inflatable body.” The Board applied this new, narrower (and incorrect) construction in the 873 Decision to distinguish the Parienti reference from the Challenged Claims. The Board’s surprise construction—revealed and applied for the first time in the 873 Decision—violates the procedural safeguards of the Administrative Procedural Act, requiring remand. Further, the Board’s substantive errors in construing and applying the new construction in the 873 Decision provide independent grounds for reversal or, at a minimum, remand.

As to the 872 Decision, the Board mistook the teachings of Miller in finding that one of skill would not have located the directional valve of Scott within Miller’s housing. Specifically, and critically, the only reasoning cited by the Board as teaching away from the arrangement does not exist—that is, there is no “statement of preference” for the valve location in Miller. Without that reasoning, the Board’s finding of no motivation to combine the Miller and Scott references as asserted is not supported by substantial evidence, requiring reversal or, at a minimum, remand.

STATEMENT OF THE ISSUES

The issues presented are:

1. Whether the Board procedurally erred in the 873 Decision by changing theories and newly construing the term “built into” in violation of *SAS Institute, Inc. v. ComplementSoft, LLC*, 825 F.3d 1341, 1351 (Fed. Cir. 2016), *rev’d and remanded on other grounds*, *SAS Institute, Inc. v. Iancu*, 138 S. Ct. 1348 (2018).
2. Whether the Board erred in the 873 Decision by (1) newly construing “built into” to require a “partial recess”; and (2) ignoring the teachings of Parienti in applying its new construction of “built into” to the prior art.
3. Whether the Board erred in the 872 Decision by mistakenly crediting a non-existent “statement of preference” for a valve location in Miller; and, in the absence of the non-existent “statement of preference,” whether the Board’s conclusion of non-obviousness is supported by substantial evidence.

STATEMENT OF THE CASE

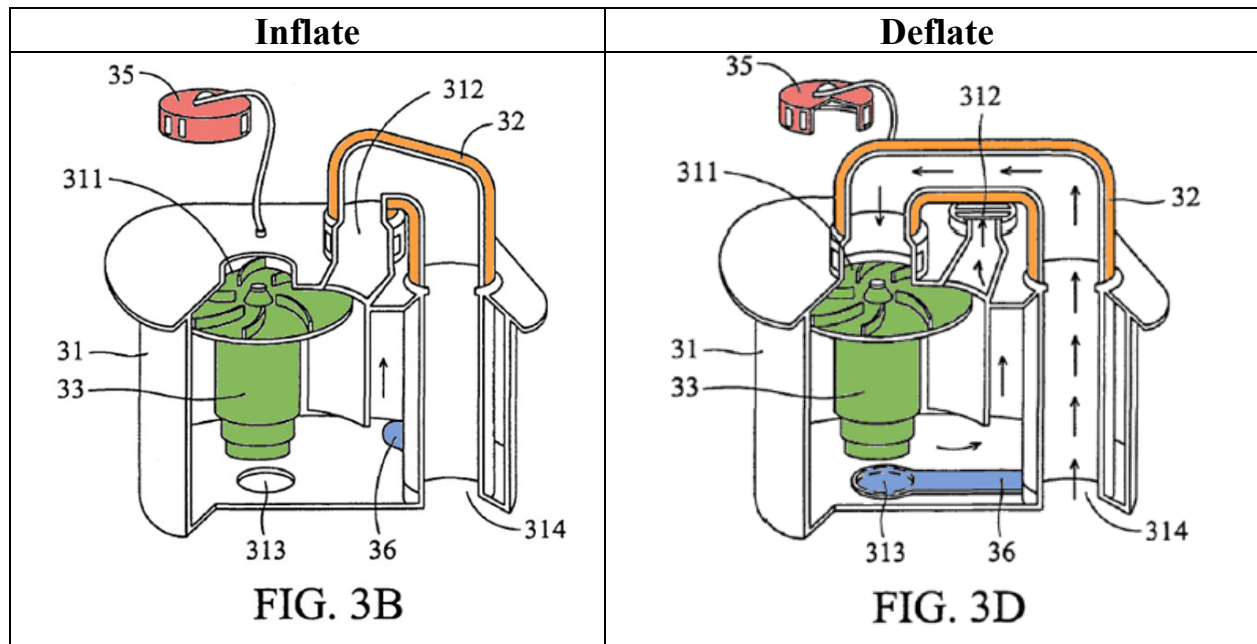
I. The '394 Patent: A Built-in Pump with a Movable Air Conduit

The '394 Patent is directed to an “inflatable product provided with an electric pump,” and claims priority to an application filed on June 22, 2001. (Appx546; Appx581, 1:14-15.)³ More specifically, the '394 Patent relates to an inflatable product having a pump with a housing “built into [the] inflatable body” and including an “air conduit movable between a first position” for inflating the inflatable product and “a second position” for deflating the inflatable product. (Appx546, Abstract.)

Figures 3A through 3D disclose the sole relevant embodiment. (Appx6795 (electing to proceed with prosecution as to claims covering “the single disclosed species shown in Figures 3A-3D”).) Referring to Figures 3A and 3D, below, the electric pump includes a housing 31 and switching pipe 32 (orange). (Appx582, 4:13-16, 4:29-31.) In a first position (shown in Fig. 3B, at left below), “the switching pipe 32 is connected to the air outlet 312 on the top surface of the housing 31” and the “inflatable product (not shown) is inflated by the fan and motor 33 [green].”

³ This appeal involves six separate appeals that have been consolidated into one proceeding. (See Dkt. No. 2.) Because the underlying record for each appeal includes overlapping evidence, for the sake of clarity, the parties have agreed to cite to evidence common to each appeal using a single copy of that evidence. For example, with respect to the '394 Patent, the parties have agreed to cite to the single copy of the '394 Patent in the record of IPR2018-00870 throughout their briefing.

(Appx582, 4:22-26.) In a second position (shown in Fig. 3D, at right below), “the switching pipe 32 [orange] is switched from the air outlet 312 to the air intake 311 on the top surface of the housing 31,” such that “the inflatable product is evacuated by the fan and motor 33 [green].” (Appx582, 4:29-31, 4:34-35.)



(Appx553–554, Figs. 3B, 3D (annotated); Appx3670–3671.)

Claim 1 is representative of the Challenged Claims and recites an inflatable product having a pump housing built into an inflatable body and including a movable air conduit disposed at least in part in the housing:

1. An inflatable product including:
 - an inflatable body;
 - a *housing built into the inflatable body*, the housing having an interior region; and
 - an *air conduit disposed at least in part in the housing*, the air conduit being movable between a first position and

a second position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;

wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.

(Appx584, cl. 1 (emphases added).) The Board did not separately consider the limitations of dependent claims 2-12 and 16-23. (Appx384, Appx393; Appx334–335.)

II. The State of the Art

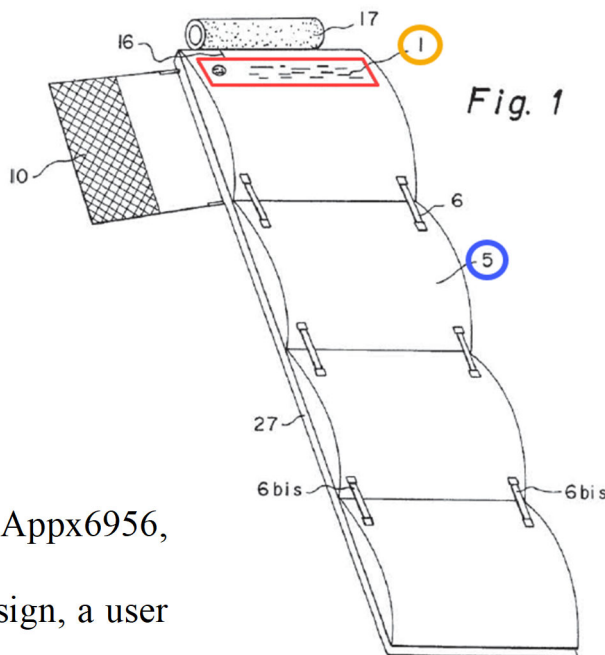
This case is about inflatable products with built-in air pumps—a technology more than a century old. *See, e.g., Intex Recreation Corp. v. Team Worldwide Corp.*, 860 F. App’x 717, 720, 723 (Fed. Cir. 2021) (this Court citing evidence of built-in pumps dating back to 1888 and agreeing that given the “‘volumes of prior art,’ including Goldsmith and others throughout the 1900s, that discuss recessed pump designs,” the Board erred in finding the claims of the related ’018 Patent⁴ non-obvious); *id.* (crediting “Intex’s showing that numerous references since the late 1800s illustrated prior artisans’ intuitive desire to recess pumps to save space”);

⁴ It is undisputed that the ’018 and ’394 Patents are closely related and “mutually relevant.” (Appx4052 (TWW asserting that the ’018 Patent “is relevant to the ’394 [Patent] in part because both cover inventions by the same sole inventor, both include an identical Field of Invention, both use many of the same terms . . . , and both issued from co-pending families which cover mutually relevant subject matter.”))

(Appx6053–6075 ¶¶ 52–106; Appx6280–6303 ¶¶ 52–106.) The '394 Patent purports to claim a species of this well-known technology, but the Challenged Claims are repeatedly disclosed in the prior art. Relevant here are the Parienti, Miller, and Scott references, which are summarized below.

A. Parienti

Issued February 1, 2000, Parienti is directed to an “automatically inflatable, deflatable and foldable solar-powered cooler mattress with a sunshade[.]” (Appx6955, Abstract.) More specifically, referring to Figure 1, below, Parienti discloses an inflatable mattress 5 (blue) and an associated pump device (outlined in red) that includes a solar panel 1 (orange), which is situated on top of mattress 5 and “made interdependent with the mattress by means of gluing or any other means.” (Appx6959, 1:24–26; Appx6956, Fig. 1 (annotated).) As a result of this design, a user has “[n]o more need to get an air pump[.]” (Appx6959, 1:24–26.)



The pump device includes a solar panel 1 and a housing structure 3 and protective grid 8 through which air is drawn into the housing. (Appx6959-6960,

2:55-3:2; *see also* Appx10050, ¶ 62 (TWW’s expert referring to Parienti’s “housing”).)

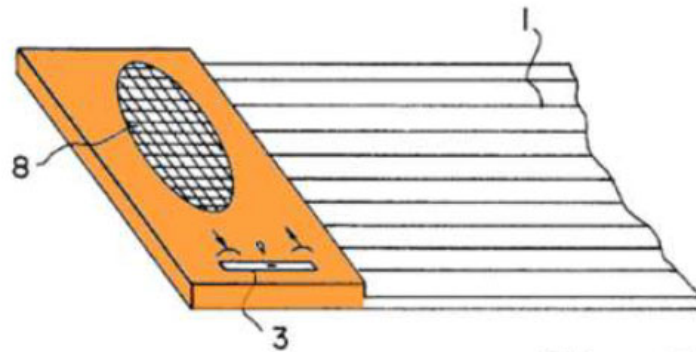


Fig. 5

(Appx6957, Fig. 5 (annotated); Appx367.) Referring to Figure 4 (a “cross-section of the device shown in FIG. 5” (Appx6959, 1:45-47)), below, a motor 2 (**orange**) and turbine 4 (**blue**) contained within the housing (identified in **gray** by Petitioners) and a valve 19 located within pipe 9 of that housing. (Appx6959–6960, 1:25-30, 2:55-3:11.)

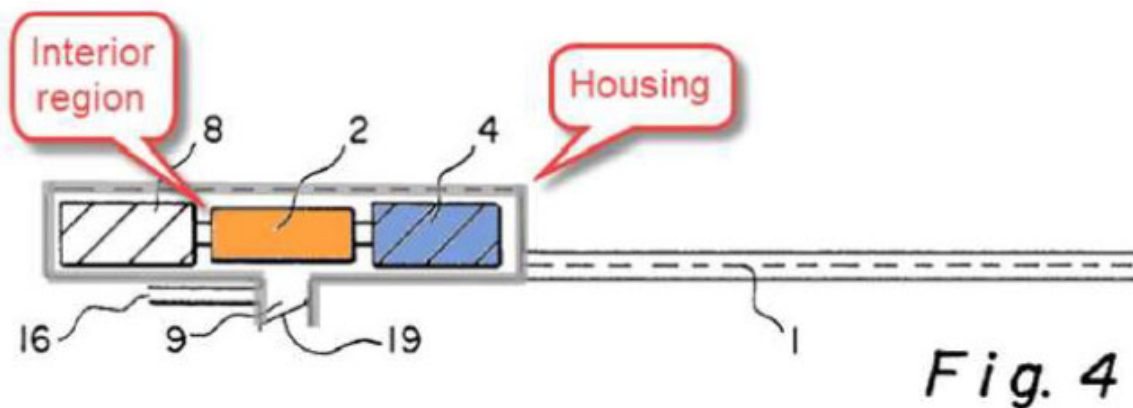


Fig. 4

(Appx6957, Fig. 4 (annotated); Appx366.)⁵ This Court, in considering the same reference in the context of the related '018 Patent found that the “slight[]” modification of Parienti to partially recess the pump device—that is, both the housing and the solar panel—was obvious in view of the “numerous references since the late 1800s [that] illustrated prior artisans’ intuitive desire to recess pumps to save space.” *Intex*, 860 F. App’x. at 723.

The only question the Court must resolve with respect to Parienti is whether it teaches a “housing built into the inflatable body.”

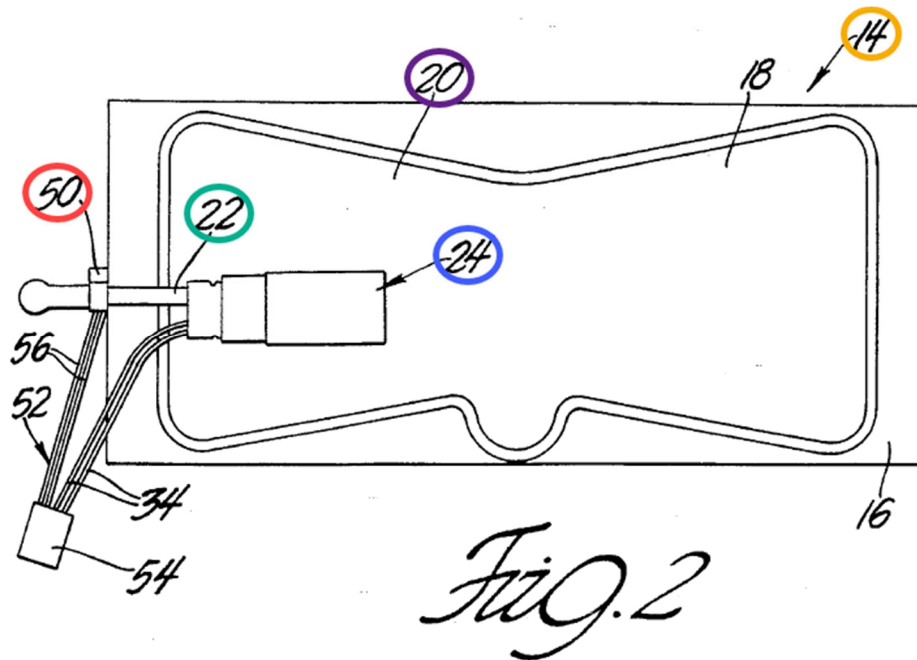
B. Miller

Issued June 25, 1996, Miller is directed to “automotive seats that include air cells to adjust the comfort of the seat.” (Appx7131, 1:7-9.) Miller discloses an automotive seat 10, including an air cell module 14 and an air pump assembly 24 that “is disposed inside the air cell” 20 of module 14. (Appx7127, Abstract; Appx7128, Fig. 1.)

Referring to Figure 2 (which shows a front view of the air cell module 14), below, Miller discloses that air pump assembly 24 (**blue**) of module 14 (**orange**) includes a housing 26 (shown but not labeled) and a reversible motorized pump 38 (not shown) contained within that housing. (Appx7132, 3:40-42, 4:27-30.) Miller

⁵ See also Appx360 n.8 (“The lead line for protective grid 8 in Parienti’s Figure 4 mistakenly extends to a portion of turbine 4 rather than to protective grid 8, which is represented as the horizontal dashed line *above* turbine 4 and motor 2.”).

further discloses a solenoid valve 50 (red) “disposed outside the air cell 20 [purple] and connected to the exterior end of [an] air tube 22 [green] to control the flow of air to and from the air cell 20.” (Appx7132, 4:14-17.)

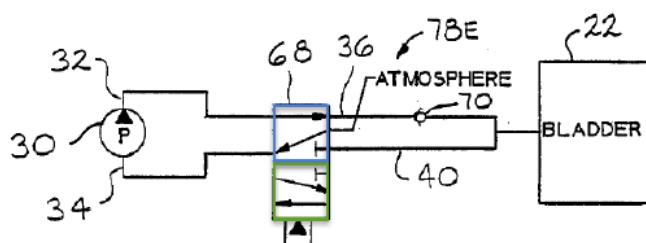


(Appx7128, Fig. 2 (annotated).) Miller states that the “object of this invention” is to “provide an air cell and all the major ancillary equipment for inflating and deflating the air bag as a unit handled assembly or module that is compact for easy shipment and handling and that can be attached to the automotive seat quickly and easily in a production line environment.” (Appx7131, 2:10-16.)

The only question the Court must resolve with respect to Miller is whether in substituting Miller’s reversible pump, the skilled artisan would have located the movable air conduit of Scott (discussed below) within Miller’s pump housing.

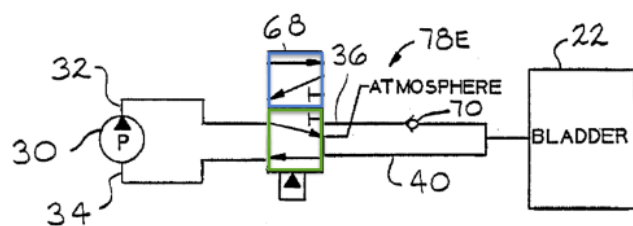
C. Scott

U.S. Patent No. 4,938,528 (“Scott”) issued July 3, 1990 and covers “a seat assembly with an inflatable bladder . . . having an air delivery system for both inflating and deflating the bladder.” (Appx7116, Abstract.) Scott uses a single pump to both inflate and deflate the inflatable bladders, using a “two position, four way valve 68” that connects the pump inlet with the atmosphere during inflation and with the bladder during deflation, as shown in the annotated versions of Figure 12 below:



—FIG. 12

(Inflation)



—FIG. 12

(Deflation)

(Appx7120, Fig. 12 (annotated); Appx313; Appx2708.)

D. Design Pressures & Motivations in the Art

The skilled artisan has long been motivated by concerns for spatial efficiency and durability in improving inflatable products, including those with housing-contained pump designs. (See Appx291 (crediting Dr. Beaman’s testimony (Appx ppx6053–6075 ¶¶ 52–106) as “discussing the state of the art for inflatable products and pumps”).) Indeed, this Court explicitly recognized that “numerous references since the late 1800s illustrated prior artisans’ intuitive desire to recess pumps to save space.” *Intex*, 860 F. App’x. at 723.

Spatial efficiency—Early inflatable product designs included pumps with components uncontained by any sort of enclosure. (Appx6069 ¶¶ 90–91.) Eventually, however, designs migrated toward more compact designs in which pump components were contained within housings. (Appx6070 ¶ 92 n.15 (citing, as examples, Appx6983–6986, Figs. 20-31; Appx7231, Fig. 3B; Appx7247–7251, Figs. 1–7, 11).) Such designs were directly associated with the efficient use of space (Appx6071 ¶¶ 93–94 (citing, as examples, Appx7257, Abstract; Appx7267, 3:19-21)).

The skilled artisan recognized the benefits of spatial efficiency in other contexts too. Miller, for example, disclosed an “electric motor driven air pump subassembly 24” “disposed inside the air cell 20 and welded in place.” (Appx7132, 3:31-33; Appx6074, ¶ 102.) Miller associated this design with increased spatial

efficiency, describing it as “compact,” facilitating “handling and shipment” of the air cell, and “reduc[ing] space requirements in the [automotive] seat.” (Appx7131, 2:40-45; Appx6074, ¶ 102; *see also* Appx6947, 1:19 (recognizing that “space is limited” in inflatable products designs); Appx7485, 12:61-63 (describing as “unobtrusive[]” a design that located the pump “within the boundaries of the mattress”).)

Durability—The POSA has likewise long recognized the benefits of improved durability. U.S. Patent No. 388,037 to Hargin, for example, disclosed an air mattress that could also function as a life raft. (Appx6054–6055 ¶¶ 57–60; Appx6071–6072 ¶ 97.) With this design, the mattress was “provided with means for readily inflating it” in the form of a pump F “inserted” into and “wholly inclosed [sic] within” one end of the mattress. (Appx7191, Figs. 1–2; Appx6055 ¶¶ 58–59.) Hargin associated this design with enhanced “durability” (Appx7194, 9-14), stating that the pump was protected “from accident, injury, or separation when plunged into water” and used as a life raft. (Appx7195, 127-131; Appx6055 ¶ 60; Appx6071–6072 ¶ 97; *see also* Appx7196, 18-22.)

The POSA also recognized the durability benefits of housing-contained pumps. U.S. Patent No. 7,039,972 to Chaffee, for example, disclosed an “inflatable device with a recessed fluid controller[.]” (Appx6939, Abstract.) Chaffee disclosed that this fluid controller “includes a housing 90 that surrounds the inner workings of

the pump” so as to “protect the inner workings of the pump[.]” (Appx6071 ¶ 96 (citing Appx6948, 4:19-20).) Unsurprisingly, volumes of prior art disclose housing-contained pump designs. (Appx6070 ¶ 92 n.15 (citing, as examples, Appx Appx6983–6986, Figs. 20-31; Appx7231, Fig. 3B; Appx7247–7251, Figs. 1–7, 11; Appx7417–7421, Figs. 1, 4–6; Appx7304–7305, Figs. 8–9).)

III. The IPR Proceedings

The chart below summarizes the challenged claims, outcomes, and grounds of the five proceedings at issue in the consolidated appeals. Relevant to this brief are the 872 and 873 Decisions, which are addressed below.

Matter	Grounds and Outcome
IPR2018-00870	<ul style="list-style-type: none"> • All Challenged Claims unpatentable under 35 U.S.C. § 103 in view of Wu + Chaffee • All Challenged Claims unpatentable under 35 U.S.C. § 103 in view of Wu + Goldsmith
IPR2018-00871	<ul style="list-style-type: none"> • Claims 1-3, 7-12, 16-18, 22 and 23 unpatentable under 35 U.S.C. § 103 in view Walker + Chaffee • Claims 1-3, 7-12, 16-18, 22 and 23 unpatentable under 35 U.S.C. § 103 in view Walker + Goldsmith • Claims 4-6 and 19-21 not unpatentable under 35 U.S.C. § 103 in view of Walker + Chaffee • Claims 4-6 and 19-21 not unpatentable under 35 U.S.C. § 103 in view of Walker + Goldsmith • Claims 4-6 and 19-21 not unpatentable under 35 U.S.C. § 103 in view of Walker + one of Chaffee, Goldsmith, or Parienti + Basic Pneumatics
IPR2018-00872	<ul style="list-style-type: none"> • All Challenged Claims not unpatentable under 35 U.S.C. § 103 in view of Miller + Scott + Wu

	<ul style="list-style-type: none"> • All Challenged Claims not unpatentable under 35 U.S.C. § 103 in view of Miller + Scott + Pisante
IPR2018-00873	<ul style="list-style-type: none"> • All Challenged Claims not unpatentable under 35 U.S.C. § 103 in view of Parienti + Renz • All Challenged Claims not unpatentable under 35 U.S.C. § 103 in view of Parienti + Wu
IPR2018-00874	<ul style="list-style-type: none"> • All Challenged Claims unpatentable under 35 U.S.C. § 103 in view of Chaffee + Wu • All Challenged Claim unpatentable under 35 U.S.C. § 103 in view of Chaffee + Scott + Pisante

SUMMARY OF ARGUMENT

The Challenged Claims of the '394 Patent are invalid as unpatentable. The Board, however, overlooked additional grounds of unpatentability in the 873 and 872 Decisions.

First, in the 873 Decision, the Board procedurally erred by revealing a surprise construction of the term “pump housing built into an inflatable body”—a term for which the parties agreed upon the initial construction—for the first time in the Final Written Decision. As this Court has recognized, “it is unreasonable to expect parties to brief or argue agreed-upon matters of claim construction,” particularly where (as here) the agreed claim construction was borrowed from another agency or court. *Qualcomm Inc. v. Intel Corp.*, 6 F.4th 1256, 1263 (Fed. Cir. 2021). Here, from the start, the parties agreed that “built into” meant “integrated into and not detachable from.” (Appx358.) Yet in the 873 Decision, the Board

added what it termed an “at-least-partial recess requirement” to the agreed construction of “built into.” The Board then used that materially narrower (and incorrect) construction to find that Parienti did not disclose a housing “built into” the inflatable body. Under the Administrative Procedure Act (APA), the Board’s procedural error requires, at a minimum, remand.

Second, and in addition to the procedural error, the Board erred substantively in construing and applying “built into” in the 873 Decision to require an “at-least partial recess” of the housing into the inflatable body. The Board’s construction of “built into” renders superfluous limitations in related patents. Moreover, even if the Board’s “at-least-partial recess” requirement is considered to be procedurally proper (it is not) or substantively correct (it is not), the Board’s application of the “at-least-partial recess” requirement to Parienti is unsupported by substantial evidence. Accordingly, the Board’s 873 Decision finding the Challenged Claims patentable should be reversed, or at a minimum, remanded.

Third, in the 872 Decision, although the Board correctly found that a skilled artisan would have been motivated to combine the Miller and Scott references generally, the Board mistook the teachings of Miller in finding that one of skill would not have located the valve of Scott within Miller’s housing. Specifically, and critically, the only reasoning provided by the Board as teaching away from the combination—a non-existent “statement of preference” for the valve location in

Miller—is without citation and does not appear to exist. Without that reasoning, the Board’s finding of no motivation to combine the Miller and Scott references as asserted is not supported by substantial evidence, requiring—at a minimum—remand.

STANDARD OF REVIEW

“IPR proceedings are formal administrative adjudications subject to the procedural requirements of the Administrative Procedure Act (‘APA’).” *SAS Inst., Inc. v. ComplementSoft, LLC*, 825 F.3d 1341, 1351 (Fed. Cir. 2016), *rev’d and remanded on other grounds, SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348 (2018). A reviewing court must set aside agency action if it is “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law” or “without observance of procedure required by law.” 5 U.S.C. § 706(2)(A), (D).

This Court reviews “the Board’s claim construction according to the Supreme Court’s decision in *Teva Pharmaceuticals U.S.A., Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015),” and where, as here, the Board did not rely upon extrinsic evidence, “the ultimate construction of the claim [is reviewed] *de novo*.” *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1279–80 (Fed. Cir. 2015).

This Court reviews “the Board’s ultimate obviousness determination *de novo* and underlying factual findings for substantial evidence.” *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1218 (Fed. Cir. 2016) (citation omitted). The question of

whether there existed a motivation to combine prior art references “is an issue of fact, [reviewed] for substantial-evidence support.” *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1363 (Fed. Cir. 2018) (quoting *Skky, Inc. v. MindGeek, s.a.r.l.*, 859 F.3d 1014, 1021 (Fed. Cir. 2017)).

ARGUMENT

I. The Board Procedurally Erred in Newly Construing “Built Into” in the 873 Final Written Decisions

In its Institution Decision, the Board preliminarily construed “built into” as “integrated into and not detachable from,” which was also the agreed construction. (Appx3852; Appx357–358.)

In the Final Written Decision in the 873 proceeding, however, the Board effectively adopted a new construction of this term.⁶ The Board imposed an additional limitation, explaining that “built into” requires “*at least some* level of recess of the ‘housing’ *into* the ‘inflatable body’”—which the Board referred to as “the at-least-partial recess requirement”—a narrower construction than initially adopted by the Board and agreed to by the parties. (Appx383 (emphasis original).)

This new and unanticipated construction, and the Board’s application of the “at-least-partial recess requirement,” caused the Board to incorrectly find the

⁶ While the Board paid lip service to the agreed construction (Appx358), the Board’s analysis confirms that it narrowed the agreed construction, as explained herein.

Challenged Claims patentable in the 873 proceeding. As a result, and as explained below, remand is warranted.

A. The Board Diverged from the Agreed-Upon Construction of “Built Into” in the 873 Final Written Decision

The two independent Challenged Claims of the ’394 Patent, claims 1 and 16, both recite “a housing ***built into*** the inflatable body.” (Appx584–585, cls. 1, 16 (emphasis added).) In its Institution Decision, the Board construed “built into” to mean “integrated into and not detachable from”—language the Board borrowed from the *Markman* order of a related district court proceeding involving the ’394 Patent. (Appx3849–3850 (citing Appx7708–7709).) Notably, this construction was agreed. (Appx357–358; Appx4048; Appx8955, ¶13.)

In its 873 Decision, however, the Board imposed an additional requirement on “built into”—specifically, that this term requires “***at least some*** level of recess of the ‘housing’ ***into*** the ‘inflatable body.’” (Appx383 (emphasis original).) As support for its new claim construction, the Board cited the specification:

The understanding that “built into” requires at least some level of recess of the “housing” into the “inflatable body” is also supported by the specification, which, for example, describes pump assembly 43 in Figure 4A as “built into the mattress pad 41.”

(Appx383.) Based on this new construction, the Board distinguished Parienti, despite Parienti’s express teaching—relied upon by Petitioners—that the pump

device was “made interdependent with” the air mattress. (Appx383 (explaining that Parienti’s design “does not satisfy the at-least-partial recess requirement”).)

“IPR proceedings are formal administrative adjudications subject to the procedural requirements of the Administrative Procedure Act (“APA”). *SAS Inst.*, 825 F.3d at 1351 (citing *Dell Inc. v. Acceleron, LLC*, 818 F.3d 1293, 1298 (Fed. Cir. 2016); *Belden*, 805 F.3d at 1080; *Dickinson v. Zurko*, 527 U.S. 150, 154 (1999)). Accordingly, this Court has held that IPR petitioners are “entitled to notice of an agency hearing” and “shall be timely informed of . . . the matters of fact and law asserted” in IPR proceedings. *SAS Inst.*, 825 F.3d at 1351 (citing 5 U.S.C. § 554(b)(3); *Dell*, 818 F.3d at 1301). Pursuant to this requirement, this Court has “faulted the Board for announcing a claim construction that ‘varie[d] significantly’ from the uncontested construction announced in the institution decision,” *Arthrex, Inc. v. Smith & Nephew, Inc.*, 935 F.3d 1319, 1328 (Fed. Cir. 2019) (citing *SAS Inst.*, 825 F.3d at 1351), or one that “diverged from [an] agreed-upon” construction. *Qualcomm*, 6 F.4th at 1263.

A review of the record demonstrates that Petitioners were not provided with adequate notice that the Board would diverge from the agreed construction. During Institution, the only dispute between the parties as to “built into” was whether a pump housing that was “glued or welded”—as Parienti teaches—was “built into” the mattress as claimed. (Appx3849.) Indeed, the Board explicitly held that the ’394

Patent did not “explain how a housing is ‘built into’ an inflatable body” or “explain how the housing is integrated with the inflatable body.” (Appx3850) Likewise, in applying the construction of “built into” to the Parienti reference, the primary dispute was whether the housing of Parienti was separated from the mattress by an intervening structure (the solar cell array). (Appx3871.) The parties never disputed or argued whether the term “built into” included a recess requirement; indeed, the words “recess” or “recessed” appear *nowhere* in the Institution Decision.

The Board did invite the parties to “further develop” whether Parienti’s housing was “integrated into” the mattress. (Appx3871.) In its Response, TWW argued only that Parienti’s housing was not “built into” the mattress because (1) “gluing . . . may be done with glues that are detachable,” (Appx4075); and (2) the housing was not “built into” the mattress because the structures were not “a harmonious, interrelated whole,” (Appx4080). In Reply, Petitioners rebutted each of these arguments, pointing out that even if a “harmonious, interrelated whole” was required, Parienti taught that the housing is “made interdependent with” the mattress. (Appx4299–4300.) Critically, throughout the entire briefing process, neither party suggested, much less argued, that “built into” required a portion of the housing to be “recessed” or “partially recessed” into the inflatable body.⁷

⁷ In fact, the word “recess[ed]” appears *only once* in the entirety of the parties’ briefing, but in the context of a discussion of commercial embodiments and secondary considerations. (Appx4109.)

SAS Institute is directly on point. In that case, the Board construed the claim term “graphical representations of data flows” in its institution decision to mean “a depiction of a map of the path of data through the executing source code.” *SAS Inst.*, 825 F.3d at 1346. That construction went unchallenged; however, in its final written decision, the Board found petitioner failed to prove the challenged claim unpatentable, because “the prior art did not satisfy the ‘graphical representations of data flows’ limitation . . . which it newly construed to mean ‘a graphical representation comprised of icons depicting data processing steps and arrows to depict the movement of data through source code.’” *Id.* Although the Court ultimately agreed with the Board’s new claim construction, it nonetheless vacated the Board’s decision on procedural grounds.

This Court concluded that when “the Board adopted a [new] construction in its final written decision,” it unfairly “‘change[d] theories in midstream.’” *Id.* at 1351 (quoting *Belden*, 805 F.3d at 1080). The Court summarized:

[Petitioner] focused its argument on the Board’s institution decision claim interpretation, a reasonable approach considering [patent owner] agreed with this interpretation in its patent owner’s response and never suggested that the Board adopt the construction that eventually materialized in the final written decision. It is difficult to imagine either party anticipating that already-interpreted terms were actually moving targets, and it is thus unreasonable to expect that they would have briefed or argued, in the alternative, hypothetical constructions not asserted by their opponent. This is especially true for [petitioner], considering the strict fifteen page limit for its reply to the patent owner’s response.

SAS Inst., 825 F.3d at 1351-52.

Likewise, in *Qualcomm*, this Court found that the Board had to provide notice and opportunity to respond when it “diverged” from an agreed construction:

[I]t is unreasonable to expect parties to brief or argue agreed-upon matters of claim construction. This is particularly true here given that a separate agency (the Commission) had already adopted the increased bandwidth requirement for the claim term. Accordingly, under the circumstances of this case, the Board needed to provide notice of and an adequate opportunity to respond to its construction.

Qualcomm, 6 F.4th at 1263. There, as here, the parties agreed to the construction of “built into,” using language borrowed from a previous judicial proceeding.

The same conclusion (and result) is warranted here. Petitioners understood that “built into” would be interpreted as “integrated into and not detachable from” and responded to TWW’s arguments regarding gluing and “harmony” between the Parienti’s housing and mattress. The Board’s divergence in the 873 Decision to hold Petitioners for the first time to a different, new construction—the “at-least-partial recess requirement”—was error. (Appx383.)

Accordingly, remand of the 873 Decision is required.

II. The Board Erred in Construing and Applying the “Built Into” Limitation in the 873 Final Written Decision

In addition to the procedural error, the Board erred substantively in construing and applying “built into” to require an “at-least partial recess” of the housing into the inflatable body.

There is a “‘heavy presumption’ that a claim term carries its ordinary and customary meaning.” *Starhome GmbH v. AT&T Mobility LLC*, 743 F.3d 849, 857 (Fed. Cir. 2014) (citation omitted). Here, the Board was obligated to apply the broadest reasonable interpretation of the Challenged Claims, which is “the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the [patent] specification.” *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

A. The Board Erred in Construing “Built Into” to Require an “At-Least-Partial Recess”

It is well-established that “interpretations that render some portion of the claim language superfluous are disfavored.” *Akzo Nobel Coatings, Inc. v. Dow Chemical Co.*, 811 F.3d 1334, 1340 (Fed. Cir. 2016) (citation omitted). Indeed, the “notice function” served by patent claims is “undermined” if claims are construed “so as to render characteristics specifically described in those claims superfluous.” *Fifth Generation Comp. Corp. v. Int’l Business Machines Corp.*, 416 F. App’x 74, 79 (Fed. Cir. Jan. 26, 2011); *see also Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950–51 (Fed. Cir. 2006). Because “the same claim term in the same patent or related patents carries the same construed meaning,” interpretations that render limitations in related patents superfluous are also disfavored. *Omega Eng’g, Inc. v. Raytek*

Corp., 334 F.3d 1314, 1334 (Fed. Cir. 2003); *cf. Arthur A. Collins, Inc. v. N. Telecom Ltd.*, 216 F.3d 1042, 1045 (Fed. Cir. 2000) (“When prior art that sheds light on the meaning of a term is cited by the patentee, it can have particular value as a guide to the proper construction of the term, because it may indicate not only the meaning of the term to persons skilled in the art, but also that the patentee intended to adopt that meaning.”).

The Board’s “at-least-partial recess requirement” (Appx383) of the term “built into” is plainly inconsistent with these principles. Related patents explicitly recite “recessed” limitations. The ’950 Patent, for example, includes a “built in” limitation in connection with the claimed “pack,” but separately recites that the “pack . . . *extends into an interior* of the first chamber.” (Appx7703.) Construing “built into” to include an “at-least-partial recess requirement” renders superfluous the ’950 Patent limitation reciting that the “pack . . . *extends into an interior* of the first chamber.” Therefore, the Board’s construction is “disfavored” and undermines the notice function claims are intended to serve. *Akzo*, 811 F.3d at 1340; *Fifth Generation*, 416 F. App’x at 79. Likewise, the ’018 Patent recites a “built into” limitation in connection with the claimed “pump body,” but further recites that the “the pump body is . . . *wholly or partially recessed* into the inflatable body.” (Appx7688.) The Board’s “at-least-partial recess requirement” would also render

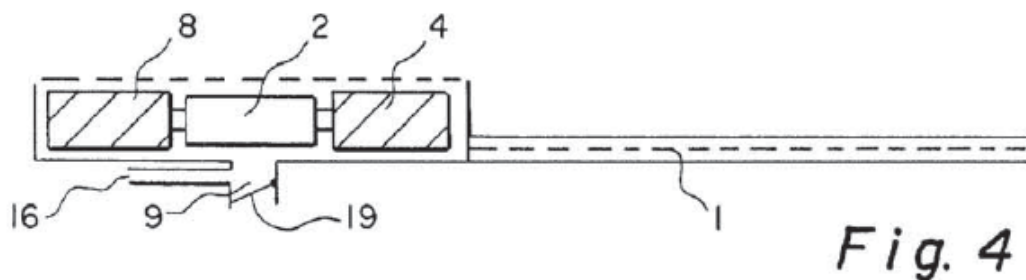
superfluous the '018 Patent requirement that the “the pump body is . . . wholly or partially recessed into the inflatable body.”

In short, even if considered, the Board’s new construction of “built into” as including an “at-least-partial recess” requirement is error. Accordingly, the Court should, at a minimum, vacate and remand the 873 decision.

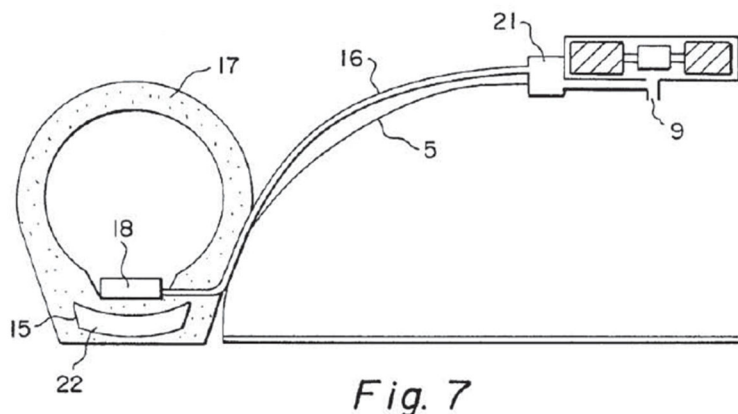
B. The Board Erred in Its Application of Its New—and Incorrect—Construction of “Built Into” to Parienti

Even under the Board’s incorrect and procedurally flawed construction of “built into,” Parienti discloses a housing “built into” the inflatable body. The Board’s finding otherwise (Appx383), is legally flawed and unsupported by substantial evidence. This issue hinges on whether pipe 9 is part of Parienti’s “housing.”

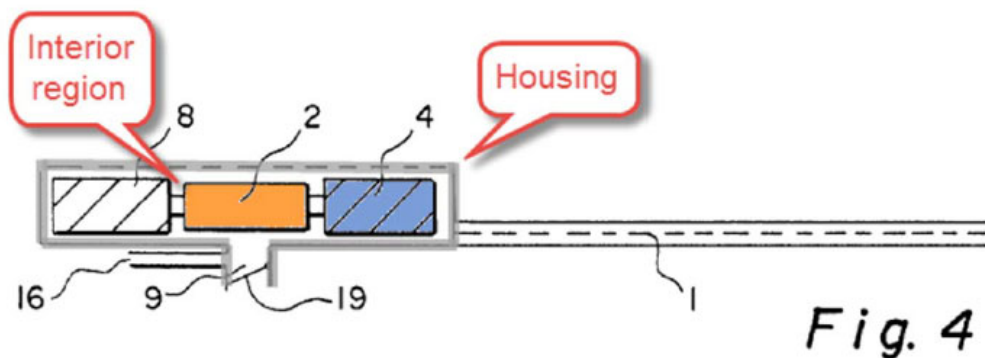
In the Final Written Decision, the Board agreed that Parienti includes a “housing,” depicted in Parienti’s Figure 5. (App379.) The Board also agreed that Parienti’s Figure 4—a cross-section of the “housing” of Figure 5—(below) shows a “structure” that “houses motor 2 and turbine 4.” (Appx379.)



(Appx6957, Fig. 4].) Figure 4 also shows pipe 9. (Appx6957, Fig. 4; Appx6960, 3:7-9, 3:23-29.) Pipe 9 also appears in Figure 7 (below), which clearly shows at least pipe 9 recessed into the inflatable mattress 5.



(Appx6957.) As the Board acknowledged, Petitioners identified pipe 9 as part of Parienti's "housing" (gray), as shown with the gray overlay in the annotated version of Figure 4 from the Petition.



(Appx3702–3703 (“Parienti also disclosed a housing (gray)”).) The Board, however, faulted Petitioners for failing to explain why “one of ordinary skill in the art *would have included* pipe 9 in the alleged ‘housing’ *but not included* other

structures shown in Figure 4, such as, for example, pipe 16.” (Appx379–380 (emphasis original).)

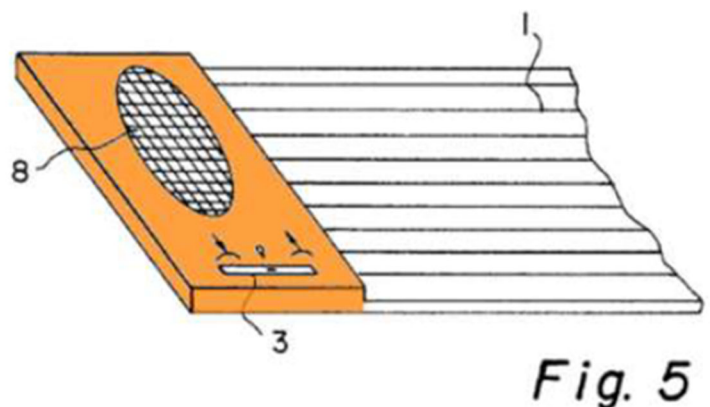
First, as addressed above, Petitioners did not address the argument because it could not anticipate the Board’s “at-least partial recess” requirement. *SAS Inst.*, 825 F.3d at 1351 (holding that is “unreasonable to expect that [Petitioners] would have briefed or argued, in the alternative, hypothetical constructions”).

Second, the Board’s analysis of Parienti is legally flawed. It is well-established that “the absence of [a] feature is pertinent only if the claims require the feature.” *Metso Minerals, Inc. v. Powerscreen Int’l Distr., Ltd.*, 526 F. App’x 988, 996–97 (Fed. Cir. 2013); *see also Senju Pharm. Co. v. Lupin Ltd.*, 780 F.3d 1337, 1347 (Fed. Cir. 2015) (noting that unclaimed features are “not relevant to the obviousness determination”). Thus, the presence or absence of pipe 16 from Parienti’s “housing” has no bearing on whether pipe 9 is part of the “housing.” *Id.* Indeed, even assuming pipe 16 is part of Parienti’s “housing,” along with pipe 9, this “housing” is *still* at least partially recessed into inflatable mattress 5. The Board’s failure to meaningfully weigh the evidence under the operative obviousness framework is reason alone to remand. *See, e.g., Applications in Internet Time, LLC v. RPX Corp.*, 897 F.3d 1336, 1358 (Fed. Cir. 2018) (remanding where the Board “assessed the evidence it did consider through the incorrect legal lens”).

Third, the Board’s analysis of Parienti is unsupported by substantial evidence. Indeed, the Board cites *no evidence* to support its conclusion that pipe 9 is not part of Parienti’s “housing.” (Appx379–380 (“Petitioner has not explained why—under the logic that Figures 4 and 5 show the same ‘device’—one of ordinary skill in the art *would have included* pipe 9 in the alleged ‘housing’ *but not included* other structures shown in Figure 4, such as, for example, pipe 16.” (citing nothing)).)

Even without the required notice and opportunity to respond to the Board’s new “at-least-partial recess” construction, including pipe 9 as part of Parienti’s “housing” is supported by the record evidence. As explained above, the Board agreed that Parienti depicts a “housing” in Figure 5 and that Figure 4 is a “cross-section of the device”—i.e., the housing—in Figure 5. (Appx379.) There is nothing to suggest in Figure 4 that pipe 9 is a separate structure from the “housing,” as there is no break or change in the lines depicted. *Cf.* 37 C.F.R. § 1.84(h)(3) (“The various parts of a cross section of the same item should be hatched in the same manner”).

Moreover, Parienti expressly teaches that pipe 9 is functionally part of the housing. Specifically, valve 19 is housed within pipe 9 and controls whether air gets into mattress 5.



(Appx6960, 3:7-9.) Valve 19 is operated by switch 3—connected to the valve by a

rod—located on the top surface of the Board-recognized “housing” in Figure 5 (right, above). (Appx6960, 3:7-15; Appx6957, Fig. 5.)

Thus, the only permissible finding based on this record is that pipe 9 is part of Parienti’s “housing” and, Parienti’s housing is at least partially recessed into the inflatable mattress 5. Therefore, reversal is warranted.

III. The Board Made a Mistake in Interpreting the Teachings of Miller in the 872 Decision

The Board erred only at the very last step of its analysis of the Miller and Scott combination in the 872 Decision. The Board correctly found:

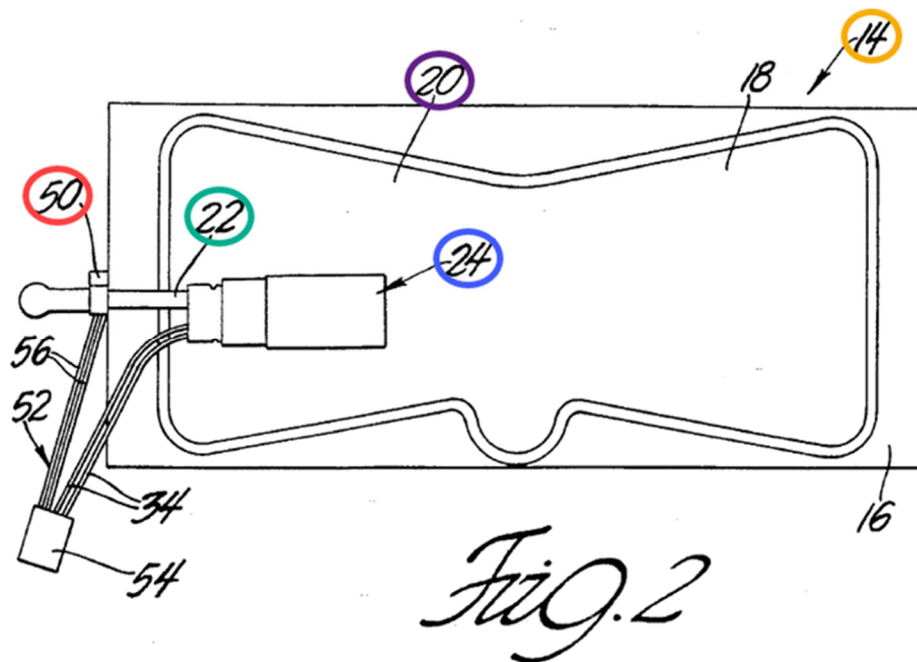
- (1) Miller discloses each claim limitation of the independent challenged claims with one exception: the “movable air conduit at least partially disposed in housing,” (Appx304–312 (explaining the Board’s limitation-by-limitation analysis of Miller);
- (2) Scott teaches the claimed “movable air conduit” in its directional valve (which, notably, was not disputed), (Appx312–315; Appx314 (noting that TWW’s dispute is limited to the location of the Scott’s valve);
- (3) the skilled artisan would have been motivated to substitute the reversible pump assembly of Miller with Scott’s uni-directional pump and directional valve 68, (Appx323 (“We find that, based on the complete record, that the Petition sufficiently articulates a reason, with

rational underpinnings, for substituting Miller’s reversible pump with Scott’s uni-directional pump and valve 68.”.)

The Board’s *only* error came in determining whether the skilled artisan would have located Scott’s directional valve 68 “at least partially” within Miller’s housing. As described below, Petitioners presented compelling evidence explaining exactly why the skilled artisan would have chosen to locate the valve within the housing, including spatial efficiency, durability, and the fact that housing-contained designs were well-known and yielded predictable results. (See Appx2737–2739 (citing Appx6135–6143 ¶¶ 197, 205–207, 209–212).) In rejecting Petitioners’ arguments, the Board relied on a so-called “statement of preference” in Miller for the valve location. But no such “preference statement” was cited, and no such “preference statement” exists. The Board’s mistake—apparently misunderstanding the teachings in Miller—requires reversal.

A. The Board Misunderstood Miller’s Teachings Regarding the Location of the Valve

Miller’s valve 50 (**red**)—the analog to Scott’s directional valve 68—is depicted in Figure 2 as located outside the housing:



(Appx7128 (annotated).) Petitioners, however, presented considerable evidence that the skilled artisan would have been motivated to locate Scott’s valve within Miller’s housing, including evidence related to the desire for spatial efficiency, durability, and that housing-contained designs were well-known. In discounting this evidence, the Board “g[a]ve weight to Miller locating valve 50 [the analog to Scott’s valve 68] outside of air cell 20 *as a preferred location.*” (Appx332 (emphasis added).) In reaching this conclusion, the Board relied on this Court’s decision in *Polaris Industries, Inc. v. Arctic Cat, Inc.*, in which this Court held that a prior art patent’s “statements regarding preferences are relevant to a finding regarding whether a skilled artisan would be motivated to combine that reference with another reference.” (Appx332 (quoting 882 F.3d 1056, 1069 (Fed. Cir. 2018).)

Miller, however, has no such “statement regarding [a] preference” for locating valve 50 outside of air cell 20.

Figure 2 of Miller does show valve 50 located exterior to air cell 20. (Appx7128.) But Miller does not provide—and neither TWW nor the Board identify—any teaching in Miller regarding a *preference* for locating the valve 50 outside of air cell 20. To the contrary, Miller’s only references to the invention’s valves simply state the location of the valves in the disclosed embodiments, without stating any preference for (or benefit of) locating the valve on the outside of Miller’s air cell 20. (See Appx7132, 4:14-17 (“The solenoid valve 50 is disposed outside the air cell 20 and connected to the exterior end of the air tube 22 to control the flow of air to and from the air cell 20.”); Appx7132, 4:65-67 (“The air cell module 114 further comprises a solenoid valve 150 that is mounted on the end of the air pump 138 and fluidly connected to the outlet of the air pump.”).)

In fact, the only statement in Miller that could be interpreted as a preference for the valve’s location supports the opposite proposition. Miller teaches locating the valve to make the design more compact—an aim that would be achieved by locating the valve within the air cell:

Still yet another feature and advantage of one embodiment of the invention is that the air pump module of the invention has an electric motor driven air pump that is disposed inside the air cell and a single solenoid *valve near the air cell to provide a compact design* to facilitate handling and shipment and to reduce space requirements in the seat.

(Appx7131, 2:40-45 (emphasis added).) The Board did not cite any teaching in Miller that contradicts this preference for a “compact design” or indicates a specific preference for externally locating the valve.

Polaris is, accordingly, inapposite. In *Polaris*, this Court criticized the Board for ignoring a stated preference in the prior art that militated against a motivation to combine the proposed prior art references. Specifically, the prior art disclosed that raising the seating area in an ATV-type vehicle resulted in a higher center of gravity and “decrease in vehicle stability and subsequent increased risk of rollovers.” 882 F.3d at 1061 (emphasis omitted). The Board found that this statement did not amount to an express teaching away, ignored the statements, and credited an obviousness combination that required a higher center of gravity. This Court vacated the Board’s decision because its “treatment of this evidence was deficient,” for failure to consider the prior art’s relevant “statements regarding preferences” and whether the proposed combination “would run contrary to one of [the prior art’s] stated purposes.” *Id.* at 1069.

Here, however, the Board made the opposite error. The Board “g[a]ve weight” to a statement of preference that does not exist. (Appx332.) In finding that the “location of valve 50 outside air cell 20” is the “preferred location,” the Board did not—and could not—cite to a passage in Miller for support. (Appx332.) Unlike in *Polaris*, there is no reasoning or comment in Miller for locating the valve 50

outside the housing. Nor does changing the location of the valve compromise the aim or purpose of Miller. It seems the Board simply made a mistake.

This mistaken “preference” teaching in Miller is the only reasoning cited by the Board against the motivation to locate a valve within Miller’s housing. (Appx332.) Without the Board’s mistake as to the existence of a teaching of a preferred location for the valve, the Board’s finding of a lack of motivation to locate Scott’s valve 68 within the housing of Miller is unsupported by substantial evidence, requiring reversal, or, at a minimum, remand.

B. Petitioners Presented Compelling Evidence that a Skilled Artisan Would Have Located the Valve Within Miller’s Housing

Petitioners presented considerable evidence that the skilled artisan would have been motivated to locate Scott’s valve 68 within Miller’s housing in the proposed combination, including evidence related to the desire for spatial efficiency, durability, and that housing-contained designs were well-known.

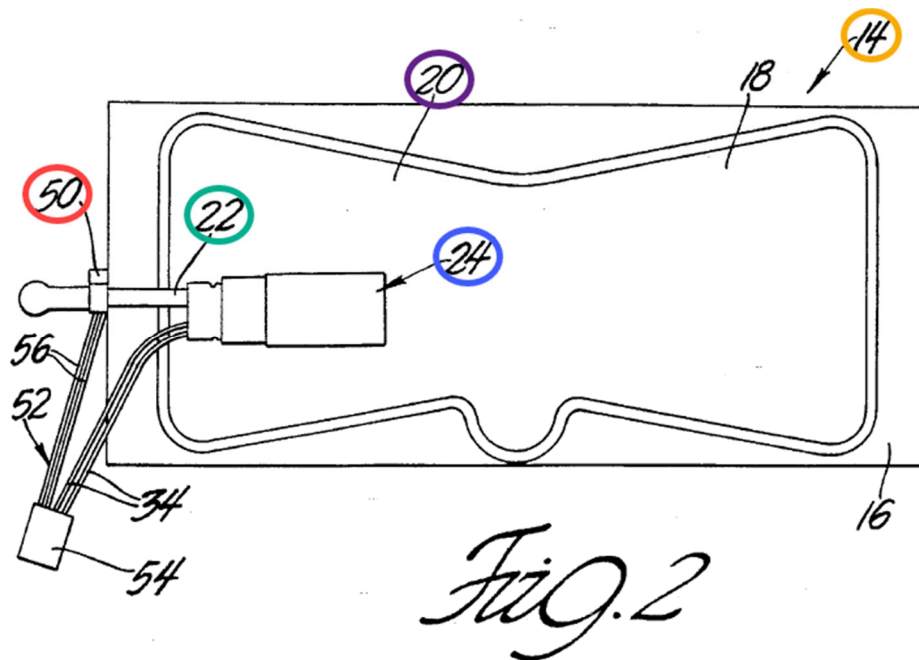
1. Miller Teaches the Desirability of “Provid[ing] a Compact Design That Facilitates Handling and Shipment and Reduces Space Requirements”

The evidence of record demonstrates that Miller and other analogous art explicitly taught the benefits of minimizing the spatial footprint of the invention—a benefit that locating the valve within the housing achieves. *See also Intex*, 860 F. App’x. at 723 (noting “numerous references since the late 1800s illustrated prior

artisans' intuitive desire to recess pumps to save space"). For example, Miller provides in the Summary of the Invention that:

The object of this invention is to provide an air cell and all the major ancillary equipment for inflating and deflating the air bag as a unit handled assembly or module *that is compact for easy shipment and handling* and that can be attached to an automotive seat *quickly and easily in a production line environment*.

(Appx7131, 2:11-16 (emphases added).) To this end, Miller teaches an embodiment in which the air cell 20 (purple) fully houses and contains the air pump assembly 24 (blue):



(Appx7128, Fig. 2 (annotated); Appx7132, 3:31-33 (“The air cell module 14 further comprises an electric motor driven air pump subassembly 24 that is disposed inside the air cell 20 and welded in place.”).) Indeed, Miller repeatedly references the advantages of a more compact, space-efficient design. (See, e.g., Appx7131, 2:11-

16, 2:40-45 (“a single solenoid valve near the air cell to provide a compact design . . . and to reduce space requirements in the seat”), 2:50-52 (“a single solenoid valve attached to the air pump to provide a compact design . . . and to reduce space requirements in the seat”)); Appx7132, 3:42-45 (“reduce the width of the housing”); Appx7133, cl. 6 (“wherein the sleeve is attached to the backing member close to the air cell to provide a compact design”).) Both expert witnesses recognized that Miller teaches the benefit of “provid[ing] a compact design.” (Appx18236 (citing Appx7131, 2:40-45); Appx6141–6142 ¶ 209.)

Miller also teaches that the design provides “plenty of room” for additional components within housing 26 of the pump subassembly 24: the housing “has plenty of room for the electric leads 34 as well as other electrical components” (Appx7132, 4:9-12.) Petitioners’ expert, Dr. Beaman, explicitly testified that POSA would have been motivated to house Scott’s valve within Miller’s housing, because a POSA would have recognized that disposing “Scott’s valve 68[] inside of Miller’s housing 26 . . . would have promoted the spatial efficiency of Miller’s converted Uni-directional Pump Assembly.” (Appx6141–6142 ¶ 209.)

Despite the repeated teaching of the benefit of compactness and spatial efficiency in Miller, the Board overlooked those teachings. (Appx327–330.) The Board concluded that Miller was concerned only with compact design in a particular plane (Appx330), without distinguishing or addressing the repeated teachings in

Miller related to the need for a “compact design” or to “reduce space requirements.” Based on the unsupported assumption that Miller only cared about compact design in the depth of the seat, the Board mistakenly concluded that there was a “lack of evidence that the areal arrangement of components is at a premium.” (Appx330.)

The Board’s conclusion is unsupported by substantial evidence. This case is on all fours with *Merck Sharp & Dohme Corp. v. Wyeth LLC*. There, as here, the Board found that all elements of the challenged claim were present in the prior art references and a skilled artisan would have been motivated to combine the references generally. 792 F. App’x 813, 817 (Fed. Cir. 2019). The Board found a lack of motivation to combine in the specific asserted arrangement without addressing the record evidence of motivation. *Id.* at 818. This Court vacated and remanded because “the Board simply did not address the evidence as to whether someone skilled in the art would have been motivated to combine the” prior art references, which amounted to a “decision [] too cryptic to survive judicial review.” *Id.* (“Under these circumstances, ‘we have consistently vacated and remanded for further proceedings.’” (citing *In re Van Os*, 844 F.3d 1359, 1362 (Fed. Cir. 2017))).

The same result should follow here. Petitioners and their expert repeatedly cited to evidence the Board confusingly stated did not exist—an express motivation in Miller for moving a valve into the housing itself. As in *Merck*, the Board’s failure

to address the record evidence of a motivation to combine is error and grounds for vacating the Board's conclusion.

2. **Miller Teaches the Importance of Increased Durability**

There was substantial evidence of increased durability that the Board gave little weight in one instance and altogether overlooked in other instances (including, in particular, with respect to Miller). Indeed, Petitioners presented extensive evidence that concerns over durability would have provided yet another reason (i.e., in addition to spatial efficiency) for the skilled artisan to have modified Miller to locate the valve within the housing. For example, Petitioners' expert Dr. Beaman explained that various prior art references repeatedly taught that "increased durability" was achieved by building a pump device into the body of an inflatable product, which serves, *e.g.*, "to protect the inner workings of the pump." (Appx6071 ¶ 96 (quoting Appx6948, 4:20); *see also* Appx6054–6055 ¶¶ 57–60.) This testimony cited the teachings of prior art references Hargin, Chaffee, and Pinkwater, which all describe the durability benefits of locating pump components within a housing. (Appx7194, 9-18; Appx7195, 129-131; Appx7196, 18-22; Appx6948, 4:20; Appx7490, 1:29-31.) Notably, this evidence and testimony went unchallenged by TWW. (Appx3117–3119 (challenging motivation to combine Scott and Miller, but not addressing durability); Appx3367 (acknowledging Petitioners argued the benefit

of durability, but characterizing its own arguments as rebutting only “efficiency, size, energy consumption, and cost”).)

The Board credited “to a small extent,” the above evidence but ultimately discounted this argument, concluding that it was “directed more to components in housings in the abstract, rather than directed specifically to Miller’s system.” (Appx331.) Again, however, this finding overlooked express teachings in Miller, including the aim of “provid[ing] a compact design that *facilitates handling and shipment* and reduces space requirements in the seat.” (Appx7131, 2:40-45 (emphasis added); *see also* Appx7131, 2:12-15 (noting objective of providing a “module that is compact for easy shipment and handling and that can be attached to an automotive seat quickly and easily in a production line environment.”).) There was no evidence—and the Board cited none—that the explicitly noted durability concerns in Miller are any different than those “in the abstract” or noted generally in the industry. In overlooking these teachings, the Board failed to “full[y] appreciat[e]” “what [Miller] fairly suggests to one of ordinary skill in the art.” *In re Suong-Hyu Hyon*, 679 F.3d 1363, 1367 (Fed. Cir. 2012).

3. Housing-Contained Valves Were Well-Known

Petitioners also presented evidence that containing a valve (such as Scott’s valve 68) within Miller’s housing 26 would have been obvious, because such an arrangement was a well-known option that yielded predictable results. (Appx2738

(citing Appx6143 ¶ 212.) Dr. Beaman testified that a POSA would have recognized that Miller—which taught an “air pump 24 [that] was already wholly contained in housing 26”—could be modified to fully contain a uni-directional pump—including a valve—inside its housing. (Appx6143 ¶ 212.) In support, Dr. Beaman cited numerous sources in the prior art that disclosed uni-directional pumps with valves contained within housings—including Walker (Appx6973–6995), Mogaki (Appx7229–7245), Grant (Appx7246–7256), Fujimoto (Appx7416–7429), and Gilroy (Appx7300–7311)—which reinforced the conclusion that a “POSA would have sought to retain this housing-contained pump design and doing so would have been well within a POSA’s technical grasp.” (Appx6143 ¶ 212.)

It is foundational that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR Int’l v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). Accordingly, where a party presents a specific motivation to combine, “[s]uch a motivation and reasonable expectation may be present where the claimed invention is the ‘combination of familiar elements according to known methods’ that ‘does no more than yield predictable results.’” *PGS*, 891 F.3d at 1363 (quoting *id.*).

Here, although the Board acknowledged Dr. Beaman’s opinion that a combination locating a directional control valve within Miller’s housing “would have been a “well-known option . . . that yielded predictable results” (Appx327) when summarizing the parties’ arguments, it appeared to wholly overlook this evidence and argument in its actual analysis. The Board’s analysis never rebutted, distinguished, or even seemingly considered Dr. Beaman’s analysis or the prior art references he cited in coming to his conclusion. (*See* Appx326–333.) The Board’s decision, which silently discounts the prior arts’ teachings regarding the option of housing pump components within a central housing, does not provide a rejection of Petitioners’ arguments and evidence that “may reasonably be discerned.” *PGS*, 891 F.3d 1365. Accordingly, the Board’s failure to address the fact that placing Scott’s valve 68 within Miller’s housing 26 would have achieved a “well-known option . . . that yielded predictable results,” provides further reason for vacating the Board’s decision on motivation to combine.

* * *

The Board made a mistake in finding that Miller included a “statement of preference” regarding the location of the valve outside the housing. Without that “statement of preference,” the Board’s conclusion that the skilled artisan would not have been motivated to locate Scott’s directional valve within Miller’s

housing cannot stand in view of the unaddressed and/or overlooked evidence presented by Petitioners.

CONCLUSION

For the foregoing reasons, Intex respectfully requests that the Court reverse or, at minimum, remand the Board's Final Written Decisions holding the Challenged Claims patentable.

Respectfully submitted,

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Addendum

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Paper 141
Date: September 25, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEX RECREATION CORPORATION and
BESTWAY (USA) INC.,
Petitioner,

v.

TEAM WORLDWIDE CORPORATION,
Patent Owner.

IPR2018-00870
Patent 7,246,394 B2

Before BEVERLY M. BUNTING, JAMES J. MAYBERRY, and
ERIC C. JESCHKE, *Administrative Patent Judges*.

JESCHKE, *Administrative Patent Judge*.

NOTICE

Notice of Disposition of Sealed Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

APPX000001

IPR2018-00870
Patent 7,246,394 B2

Intex Recreation Corporation and Bestway (USA) Inc. (collectively “Petitioner”)¹ challenges the patentability of claims 1–12 and 16–23 of U.S. Patent No. 7,246,394 B2 (Ex. 1001, “the ’394 patent”), which is assigned to Team Worldwide Corporation (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6.

On September 12, 2019, we issued a non-public version of a Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. Paper 135. For the reasons discussed in the Final Written Decision (a public version of which will issue in due course), we concluded that Petitioner has proven by a preponderance of the evidence that claims 1–12 and 16–23 of the ’394 patent are unpatentable.

¹ Walmart Inc., Wal-Mart Stores Texas, LLC, Wal-Mart.com USA LLC, and Sam’s West, Inc. d/b/a Sam’s Club (“the Walmart Entities”) were originally named as petitioners (Pet. 1); however, this proceeding was terminated with respect to the Walmart Entities during trial. Paper 122.

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The following table summarizes the determinations in this proceeding.

References	Basis	Claims Challenged	Claims Shown Unpatentable	Claims Not Shown Unpatentable
Wu ² and Chaffee ³	§ 103	1–12 and 16–23	1–12 and 16–23	None
Wu and Goldsmith ⁴	§ 103	1–12 and 16–23	1–12 and 16–23	None
Wu and Parienti ⁵	§ 103	1–12 and 16–23	Not reached	Not reached
Wu, Goldsmith, and Chaffee	§ 103	1–12 and 16–23	Not reached	Not reached
Overall Outcome		1–12 and 16–23	1–12 and 16–23	None

² US 6,698,046 B1, issued March 2, 2004 (Ex. 1005, “Wu”).

³ US 7,039,972 B2, issued May 9, 2006 (Ex. 1006, “Chaffee”).

⁴ US 2,493,067, issued January 3, 1950 (Ex. 1007, “Goldsmith”).

⁵ US 6,018,960, issued February 1, 2000 (Ex. 1008, “Parienti”).

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NON-PUBLIC VERSION – PROTECTIVE ORDER MATERIAL

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Paper 135
Entered: September 12, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEX RECREATION CORPORATION and
BESTWAY (USA) INC., Petitioners,

v.

TEAM WORLDWIDE CORPORATION,
Patent Owner.

Case IPR2018-00870
Patent 7,246,394 B2

Before BEVERLY M. BUNTING, JAMES J. MAYBERRY, and
ERIC C. JESCHKE, *Administrative Patent Judges*.

JESCHKE, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

ORDER
Denying Petitioners' Motion to Exclude
Denying Patent Owner's Motion to Exclude
37 C.F.R. § 42.64

APPX000005

NON-PUBLIC VERSION – PROTECTIVE ORDER MATERIAL

IPR2018-00870

Patent 7,246,394 B2

Intex Recreation Corporation and Bestway (USA) Inc. (“Petitioners”)¹ challenge the patentability of claims 1–12 and 16–23 (“the Challenged Claims”) of U.S. Patent No. 7,246,394 B2 (Ex. 1001, “the ’394 patent”), which is assigned to Team Worldwide Corporation (“Patent Owner”).

We have jurisdiction under 35 U.S.C. § 6, and we issue this Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons below, we conclude that Petitioners have proven by a preponderance of the evidence that claims 1–12 and 16–23 of the ’394 patent are unpatentable.

I. BACKGROUND

A. PROCEDURAL HISTORY

Petitioners filed a Petition seeking *inter partes* review of the Challenged Claims. Paper 1 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 8. We instituted a trial as to all the Challenged Claims. Paper 14 (“Institution Decision” or “Inst. Dec.”).

During the trial, Patent Owner filed a Response (Paper 52, “PO Resp.”), Petitioners filed a Reply (Paper 78, “Pet. Reply”), and Patent Owner filed a Surreply (Paper 90, “PO Surreply”).² Petitioners and Patent Owner also filed Motions to Exclude Evidence (Papers 97, 99, respectively),

¹ Walmart Inc., Wal-Mart Stores Texas, LLC, Wal-Mart.com USA LLC, and Sam’s West, Inc. d/b/a Sam’s Club (“the Walmart Entities”) were originally named as petitioners (Pet. 1); however, this proceeding was terminated with respect to the Walmart Entities during trial. Paper 122.

² Paper 51 is a public version of the Patent Owner Response. Paper 79 is a public version of the Petitioners’ Reply. Paper 92 is a public version of the Patent Owner Surreply.

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Oppositions to the motions (Papers 103, 102, respectively), and Replies to the oppositions (Papers 105, 106, respectively).

Petitioners rely on the declaration testimony of Dr. Joseph J. Beaman, Jr. (Exs. 1002 & 1625) and Mr. W. Todd Schoettelkotte (Ex. 1649). Patent Owner relies on the declaration testimony of Dr. Glen Stevick (Ex. 2029) and Dr. Stephen L. Becker (Ex. 2638).

Oral argument was held on June 7, 2019, and a copy of the transcript of that argument was entered into the record. Paper 124 (public); Paper 125 (confidential) (“Tr.”).³

B. RELATED PROCEEDINGS

The parties identify a prior proceeding in the U.S. District Court for the Eastern District of Texas (“the Texas District Court”) involving the ’394 patent: *Team Worldwide Corp. v. Walmart Inc. et al.*, No. 2:17-cv-00235-JRG (E.D. Tex.), filed March 29, 2017 (“the Texas Litigation”). Pet. 1–2; PO Resp. 2; Paper 113, 1; Paper 118, 1–2. The Texas District Court issued a claim construction order on March 15, 2018. *See* Ex. 1072. On November 20, 2018, the Texas District Court dismissed the Texas Litigation with prejudice. *See* Ex. 1680.

The Texas Litigation also involved U.S. Patent No. 9,211,018 B2 (“the ’018 patent”) and U.S. Patent No. 7,346,950 B2 (“the ’950 patent”). Pet. 2; PO Resp. 2. Petitioners filed four additional petitions for *inter partes* review of claims 1–12 and 16–23 of the ’394 patent in IPR2018-00871,

³ Public and confidential versions of the transcript in IPR2018-00875 was also entered into the record of this proceeding. *See* Paper 127 (public); Paper 128 (confidential). We do not cite to those transcripts in this Decision.

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IPR2018-00872, IPR2018-00873, and IPR2018-00874. Petitioners also filed petitions for *inter partes* review of (1) claims 1, 5, 7, and 11–14 of the ’018 patent, in IPR2018-00859, and (2) claims 1, 7, and 11–14 of the ’950 patent, in IPR2018-00875.

The parties also identify the following proceedings in the Texas District Court involving the ’394 patent, the ’018 patent, and the ’950 patent:

- (1) *Team Worldwide Corp. v. Macy’s, Inc. and Macys.com, LLC*, No. 2:19-cv-00099-JRG (E.D. Tex.);
- (2) *Team Worldwide Corp. v. Target Corp. and Target Brands, Inc.*, No. 2:19-cv-00100-JRG (E.D. Tex.);
- (3) *Team Worldwide Corp. v. The Home Depot, Inc.*, No. 2:19-cv-00098-JRG (E.D. Tex.);
- (4) *Team Worldwide Corp. v. Dick’s Sporting Goods, Inc.*, No. 2:19-cv-00097-JRG (E.D. Tex.);
- (5) *Team Worldwide Corp. v. Costco Wholesale Corp.*, No. 2:19-cv-00096-JRG (E.D. Tex.);
- (6) *Team Worldwide Corp. v. Bed Bath & Beyond, Inc.*, No. 2:19-cv-00095-JRG (E.D. Tex.);
- (7) *Team Worldwide Corp. v. Amazon.com, Inc. and Amazon.com LLC*, No. 2:19-cv-00094-JRG (E.D. Tex.);
- (8) *Team Worldwide Corp. v. Ace Hardware Corp.*, No. 2:19-cv-00093-JRG (E.D. Tex.); and
- (9) *Team Worldwide Corp. v. Academy, Ltd. d/b/a Academy Sports + Outdoors*, No. 2:19-cv-00092-JRG (E.D. Tex.).

Paper 113, 2–3; Paper 118, 3–4. According to Patent Owner, these nine proceedings are stayed pending the outcomes of IPR2018-00859 and IPR2018-00870 through -00875. Paper 113, 3.

Patent Owner also states it “filed a claim in *In re Sears Holding Corporation, et al.* chapter 11 bankruptcy cases pending before the United States Bankruptcy Court for the Southern District of New York, Case No. 18-23538 (RDD) (Jointly Administered) in which Patent Owner asserts

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infringement” of the ’394 patent, the ’018 patent, and the ’950 patent.

Paper 113, 3.

C. THE ’394 PATENT

The ’394 patent, titled “Inflatable Product with Built-in Housing and Switching Pipe,” issued on July 24, 2007. Ex. 1001, at codes (54), (45). It “relates in general to an inflatable product provided with an electric air pump.” *Id.* at 1:14–15. According to the ’394 patent, prior air mattresses included inflatable chambers that “are inflated by an electric air pump . . . , which is separately provided, requiring users to carry two items, the air mattress itself, and an electric air pump” such that “[i]nconvenience results, especially for outdoor use.” *Id.* at 1:17–24. The ’394 patent, in contrast, “provides a modified air mattress, which has a built-in electric air pump eliminating the need for an external pump.” *Id.* at 1:25–27. Figure 1A is reproduced below:

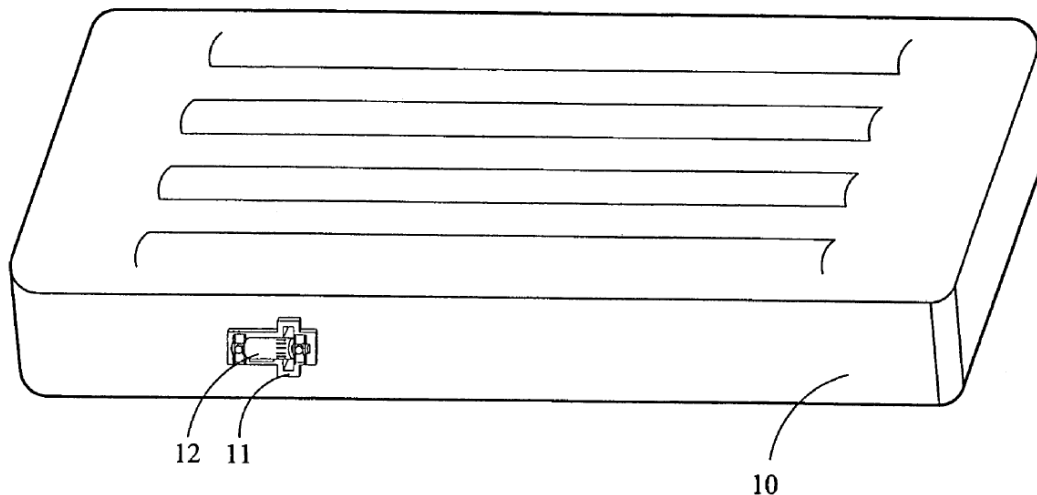


FIG. 1A

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Figure 1A depicts “a perspective diagram of an inflatable product,” which includes inflatable chamber 10, pump seat 11, and air pump 12. *Id.* at 1:50–51, 3:15–21. Figures 3A and 3B are reproduced below:

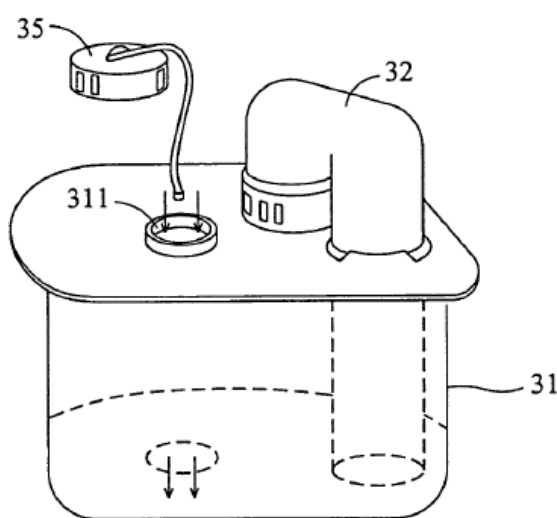
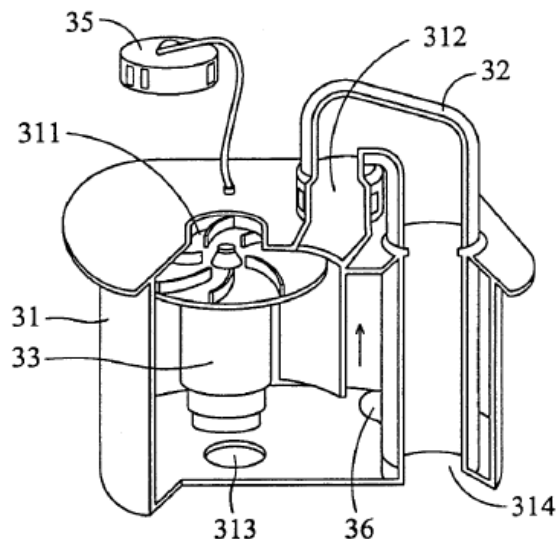
**FIG. 3A****FIG. 3B**

Figure 3A depicts an air pump of an embodiment of an inflatable product (as shown, for example, in Figure 1A) during inflation. *See id.* at 1:66–67. Figure 3B depicts the air pump of Figure 3A with portions of certain structures removed. *See id.* at 2:1–2. Figures 3A and 3B show, among other aspects, housing 31, fan and motor 33, switching pipe 32, flap 36, and cover 35. *Id.* at 4:13–16. For inflation, “the switching pipe 32 is connected to the air outlet 312 on the top surface of the housing 31” and “cover 35 is removed from the air intake 311.” *Id.* at 4:22–25.⁴ In this configuration, “[t]he inflatable product (not shown) is inflated by the fan and motor 33” as “[a]ir flows through the air intake 311 and the air outlet 313, and into the inflatable product.” *Id.* at 4:25–28.

⁴ Throughout this Decision, we omit any bolding of reference numerals in quotations from the ’394 patent and from prior art references.

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Figures 3C and 3D are reproduced below:

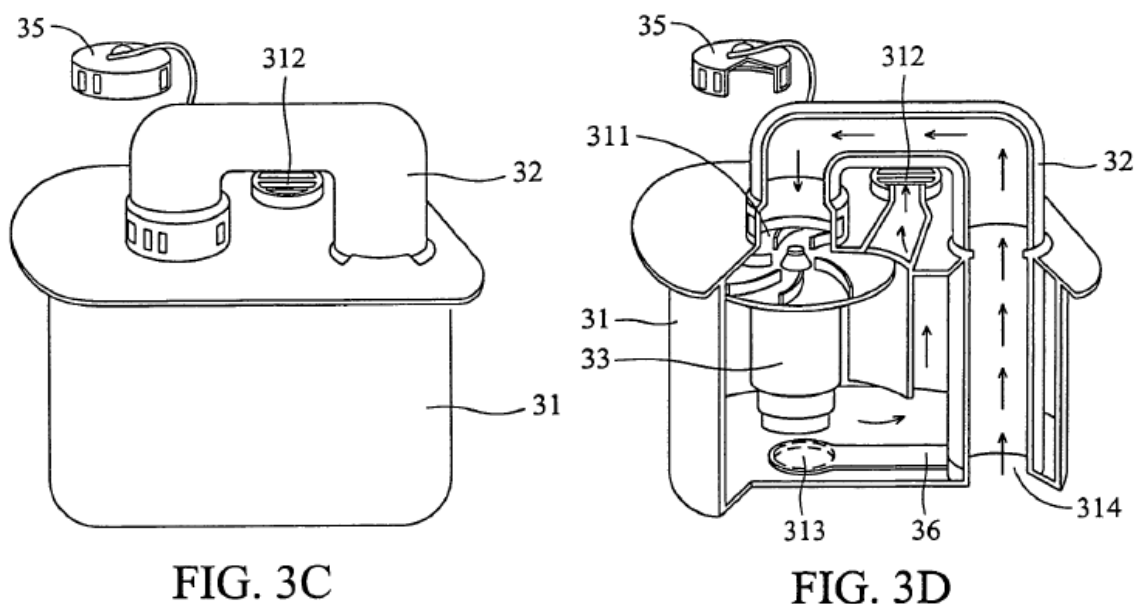
**FIG. 3C****FIG. 3D**

Figure 3C depicts an air pump of an embodiment of an inflatable product during deflation. *See* Ex. 1001, 2:3–4. Figure 3D depicts the air pump of Figure 3C with portions of certain structures removed. *See id.* at 2:5–6. For deflation, “the switching pipe 32 is switched from the air outlet 312 to the air intake 311 on the top surface of the housing 31” and “the flap 36 follows the switching pipe 32 to rotate to close the air outlet 313 on the bottom surface of the housing 31.” *Id.* at 4:29–33. In this configuration, “air in the inflatable product is evacuated by the fan and motor 33” along the path indicated by arrows such that “[a]ir flows through the air intake 314, the switching pipe 32 and the air intake 311, and into the housing 31” and “out from the air outlet 312.” *Id.* at 4:33–38.

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D. ILLUSTRATIVE CLAIM

Of the Challenged Claims, claims 1 and 16 are independent. Claims 2–12 depend from claim 1, and claims 17–23 depend from claim 16.

Claim 1 is reproduced below:

1. An inflatable product including:
 - an inflatable body;
 - a fan and motor assembly for pumping air;
 - a housing built into the inflatable body, the housing having an interior region; and
 - an air conduit disposed at least in part in the housing, the air conduit being movable between a first position and a second position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;
- wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.

Ex. 1001, 8:24–38.

Claim 16 is reproduced below:

16. An inflatable product including:
 - an inflatable body;
 - a fan and motor assembly for pumping air;
 - a housing built into the inflatable body, the housing having an interior region; and

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an air conduit having a first end and a second end, the air conduit disposed at least in part in the housing and arranged to convey air pumped by the fan and motor assembly, the air conduit being movable between a first position and a second position, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;

wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation, and

wherein the fan and motor assembly causes air to be conveyed from the first end of the air conduit to the second end of the air conduit when the air conduit is in the first position, and the fan and motor assembly causes air to be conveyed in sequence from the inflatable body, through the second end of the air conduit, to the first end of the air conduit, to ambient when the air conduit is in the second position.

Ex. 1001, 9:38–10:19.

E. INSTITUTED GROUNDS OF UNPATENTABILITY

We instituted *inter partes* review of the Challenged Claims based on the following grounds of unpatentability asserted by Petitioners:

References	Basis	Claims Challenged
Wu ⁵ and Chaffee ⁶	§ 103	1–12 and 16–23
Wu and Goldsmith ⁷	§ 103	1–12 and 16–23

⁵ US 6,698,046 B1, issued March 4, 2004 (Ex. 1005, “Wu”).

⁶ US 7,039,972 B2, issued May 2006 (Ex. 1006, “Chaffee”).

⁷ US 2,493,067, issued January 3, 1950 (Ex. 1007, “Goldsmith”).

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References	Basis	Claims Challenged
Wu and Parienti ⁸	§ 103	1–12 and 16–23
Wu, Goldsmith, and Chaffee	§ 103	1–12 and 16–23

II. DISCUSSION**A. THE LEVEL OF ORDINARY SKILL IN THE ART**

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). In the Institution Decision, we adopted Patent Owner’s formulation of the level of ordinary skill in the art: one of ordinary skill in the art would have had either (1) a bachelor’s degree in mechanical engineering or an equivalent field or (2) at least two years of experience in mechanical and electrical design aspects of inflatable products having electric air pumps. Inst. Dec. 13.

Following institution, neither Petitioners nor Patent Owner objected to this determination. *See* PO Resp. 22 (repeating the same formulation as stated prior to institution); *see also* Inst. Dec. 13 n.7 (discussing why we did not discern any special meaning for the term “designer” in Patent Owner’s formulation of the level of skill in the art for an individual without a bachelor’s degree in mechanical engineering). For the same reasons provided in the Institution Decision (*id.* at 12–14), we maintain this determination of the level of ordinary skill in the art for purposes of this Final Written Decision. Further, the patentability and claim construction

⁸ US 6,018,960, issued February 1, 2000 (Ex. 1008, “Parienti”).

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analyses below would reach the same findings and determinations under either party’s definition of the level of ordinary skill in the art.

B. CLAIM CONSTRUCTION

In an *inter partes* review based on a petition filed prior to November 13, 2018, claim terms in an unexpired patent, such as the ’394 patent, are given their broadest reasonable construction in light of the specification.⁹ *See* 37 C.F.R. § 42.100(b) (2017); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard as the claim construction standard to be applied in an *inter partes* review proceeding); *see also* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018). Under the broadest reasonable construction standard, claim terms are generally given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Petitioners propose constructions for the terms “inflatable body” (Pet. 23–26), “fan” (*id.* at 26–27), and “pipe” (*id.* at 27–28). Patent Owner

⁹ Patent Owner’s contentions regarding the applicability of the district-court-type claim construction standard are inapposite because the present Petition was filed prior to the rule change effective November 13, 2018. *See* PO Resp. 14–15, 15 n.3. Although the applicable version of Rule 42.100(b) permitted a party to request that the Board apply the district-court-type claim construction standard, Patent Owner did not provide either the required certification or the required request. *See* 37 C.F.R. § 42.100(b).

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proposes constructions for the terms “built into” (PO Resp. 16–17), “inflatable body” (*id.* at 17–20), “pipe” (*id.* at 20–21), and “fan” (*id.* at 21–22). We determined in our Institution Decision that express construction of the terms “inflatable body” and “built into” was necessary. Inst. Dec. 14–22. Based on the full record developed at trial, we maintain that view for purposes of this Final Written Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (stating that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). We discuss those two terms below.

1. “inflatable body”

Claims 1–3, 9, 11, 16–18, and 22 each recite an “inflatable body.” Petitioners argue that the broadest reasonable interpretation of “inflatable body” is “a structure that expands when filled with air or other gases.” Pet. 23 (citing Ex. 1002 ¶¶ 143–145). Patent Owner proposes to construe “inflatable body” in line with the Texas District Court as “a *substantially airtight* structure that expands when filled with air or other gases.” PO Resp. 17, 20; Ex. 1072, 14 (construing “inflatable body” in both the ’394 patent and the ’018 patent).

The only difference between the two proposed constructions is that Patent Owner (as did the Texas District Court) includes a “substantially airtight” requirement. In the Institution Decision, we preliminarily construed “inflatable body” as proposed by Petitioners: “a structure that expands when filled with air or other gases.” *See* Inst. Dec. 19. In light of

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the complete record as developed at trial, and for the reasons below, we maintain this construction of “inflatable body.”

We start with the language of the claims. *TQ Delta, LLC v. DISH Network LLC*, 929 F.3d 1350, 1357 (Fed. Cir. 2019). As noted by Petitioners, the claims do not include an *express* requirement that the “inflatable body” is substantially airtight. *See* Pet. 24 (stating that the “claims and specification lack any requirement that the inflatable body be substantially airtight”) (citing Ex. 1001, claims 1–3, 9, 11, 13, 14, 16–18, 22; Ex. 1002 ¶¶ 146–147). Neither the claim language at issue nor any other language from the claims requires the “inflatable body” to be substantially airtight.

We turn now to the Specification, which uses “inflation” to describe the process of filling a structure with air and uses “inflatable” to describe a structure *capable of* such a process, for example inflatable chamber 10. *See, e.g.*, Ex. 1001, 3:32–37, 4:22–28. We view these aspects of the Specification as aligning with and supporting the requirement—common to *both* proposed constructions and the Texas District Court’s construction—that the structure “expands when filled with air or other gases.” *See* PO Resp. 17; Ex. 1072, 14; Pet. 23.

Referring to Figure 1A of the ’394 patent (*see supra* p. 5), Petitioners contend that without pump structures 11 and 12, inflatable chamber 10 (i.e., the “inflatable body”) would have “a gaping hole” and that the pump structure “*must* be mounted on the inflatable body” to allow air flow through the pump and into the inflatable body. Pet. 24 (citing Ex. 1001, Figs. 1A, 4A; Ex. 1002 ¶ 148). Relying on the testimony of Dr. Beaman, Petitioners contend that “because the ‘inflatable body’ itself *must* always include a hole

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or opening that communicates with the pump structure, it cannot be ‘substantially airtight.’” *Id.* (citing Ex. 1002 ¶¶ 148–49).

Patent Owner responds that this argument “ignores the actual structure of the ‘394 patent that makes the overall structure with the built-in pump airtight.” PO Resp. 17–18; *see also* PO Surreply 1 (“In the context of an ‘inflatable body’ *with a ‘built in’ housing*, the ‘inflatable body’ is substantially airtight.” (emphasis added)). Patent Owner notes that claim 1 recites a “housing ***built into*** the inflatable body” and argues that “[t]he mattress in the ‘394 patent is airtight and the ‘hole’ is only introduced to build the pump into it, so the overall structure remains substantially airtight.” *Id.* at 18. Patent Owner argues that the Specification refers to the “present invention” as an “air mattress” and that “[t]hroughout the specification, the terms ‘inflatable body’ and ‘housing built into’ read together as recited in claim 1 are consistent with the substantially airtight nature of an air mattress.” *Id.* (citing Ex. 1001, 1:34–35, 1:25–28, 1:30–33, 3:15–45, 4:39–62, 5:48–64, 6:10–16, Figs. 1A, 4A, 5A, 7A).

With this argument and its proposed construction, Patent Owner conflates the preamble term “inflatable *product*” with the claim term at issue—“inflatable *body*.” *See, e.g.*, PO Resp. 18 (arguing that the “overall structure” is “airtight”). Both independent claims 1 and 16, as well as the Specification, distinguish between an “inflatable product” and an “inflatable body.” *See* Ex. 1001, 8:24–25 (claim 1, reciting “[a]n inflatable product” in the preamble and “an inflatable body” in the body), 9:38–39 (claim 16, reciting “[a]n inflatable product” in the preamble and “an inflatable body” in the body), 4:39–43 (describing an “inflatable product” including mattress pad 41 into which pump assembly 43 is built), 5:48–51 (describing an

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“inflatable product” with two “inflatable chambers,” an air pump assembly, and a two-way valve), 7:20–27 (describing an “inflatable product” including an inflatable shank and air pump that supplies a shank with air).

Here, we agree with Patent Owner that the relevant “overall structure” (PO Resp. 18)—i.e., the “inflatable *product*” depicted in, for example, Figure 1A—could reasonably be said to be substantially airtight.¹⁰ *See* Ex. 1001, 1:49–51 (describing Fig. 1A as a “perspective diagram of an inflatable product in accordance with a first embodiment of the present invention”); PO Resp. 19 (arguing that “every ‘394 patent embodiment is substantially airtight”); Tr. 58:1–3 (“Every embodiment of the 394 Patent is substantially airtight. It is intended to inflate, keep the air in, and then deflate, that’s the whole point of it; otherwise nobody would use them.”). That is, pump structures 11, 12, and covers 14, 14’ work in concert to ensure that air does not leak from the opening in inflatable chamber 10 at holes 111, 112. *See* Ex. 1001, 3:15–45.

In contrast, inflatable chamber 10, *by itself*—which corresponds with the recited “inflatable body”—need *not* necessarily be substantially airtight, as these additional structures (discussed above) would not be present to retain substantially all air added to chamber 10. *See id.* at 3:21–23 (describing holes 111, 112 through which air passes into inflatable chamber 10); *see also id.* at Fig. 4F (depicting valve 436’ as sealing the air passage to mattress pad 41 through air outlet 4302’), 7:27–65 (describing the operation of check valves to control the flow of air into and out of shank 92);

¹⁰ Patent Owner does not argue that the preambles to independent claim 1 or claim 16 are limitations and does not argue that Wu fails to satisfy the preambles. *See infra* note 13.

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Tr. 11:19–12:2 (discussing how a party balloon could be an “inflatable body” under Petitioners’ construction even with a hole in it for inflation and how *other structures* could make the overall system substantially airtight).

To Patent Owner, an “inflatable body” must not only “fill[]” when “[y]ou add air to it” (Tr. 56:2)—as essentially required by our preliminary construction—but, *in addition*, an “inflatable body” must, if “you stop adding air,” “retain[] that air until you deflate it” (*id.* at 56:2–3)—i.e., the substantially airtight requirement. Although we agree with Patent Owner to the extent that an “inflatable body” must retain air *sufficiently* such that it “expands when filled with air or other gases” as required by our construction, for the reasons above, we do not agree that this means that the “inflatable body” must be “airtight” or even “substantially airtight.”

Tr. 52:9–14 (“To summarize [Patent Owner’s] position on inflatable body, it is the inflatable body of the inflatable product *is an airtight chamber*, bladder, and the fact that you cut a hole in it, but then plug the hole is the whole point of this, is that *it remains airtight in usage*, and we think that the semantic argument that’s not a real-world argument about how the term is used in the 394 Patent.” (emphasis added)).

The distinction between the “inflatable body” and the “inflatable product” also provides context for two statements by Petitioners’ expert, Dr. Beaman, highlighted by Patent Owner (PO Resp. 18): (1) that one of ordinary skill in the art “would have generally understood *an air mattress* to be a substantially airtight structure” (*see* IPR 2018-00871, Ex. 1102 ¶ 186 (emphasis added)) and (2) that the “invention” of the ’394 patent is substantially airtight (PO Resp. 18 (citing Ex. 2040, 94–95)). We view these statements as supporting Petitioners’ position that the product as a whole

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(i.e., the recited “inflatable product”) would be substantially airtight, but not necessarily supporting Patent Owner’s position that the recited “inflatable body” is substantially airtight. *See, e.g.*, Ex. 2040, 95:9–14 (“Q. All of the invention of the ’394 patent is about putting out an air mattress that is actually substantially airtight when it’s filled, right, that’s the goal? . . . A. *Of the entire product, yes.*” (emphasis added)). That the “inflatable product” recited in the preamble may, *as a whole*, be substantially airtight does not necessarily mean that the “inflatable body” at issue—i.e., a *component* of the “inflatable product”—must, *on its own*, be substantially airtight.¹¹

For these reasons, we do not view the Specification as supporting Patent Owner’s position that, under the broadest reasonable construction, the recited “inflatable body” must be “substantially airtight.”

Second, we turn to the prosecution history and the related issue of the constructions of “inflatable body” by two district courts. Patent Owner asserts to have “contemporaneously defined the term ‘inflatable body’ as being ‘substantially airtight’” based on a statement made during prosecution of the ’018 patent—i.e., a patent *other than* the ’394 patent at issue in this proceeding. PO Resp. 19 (citing Ex. 2045, 105–117). According to Patent Owner, “[t]he definition of ‘inflatable body’ determined in the ’018 Patent is evidence of [one of ordinary skill in the art’s] proper construction of the

¹¹ Solely by way of analogy, a customary party balloon (with a large hole for inflation) would likely be “a structure that expands when filled with air or other gases,” but would not *alone* be substantially airtight under Patent Owner’s understanding. *See* Tr. 11:19–12:2 (counsel for Petitioners discussing this analogy when addressing their proposed construction for “inflatable body”). Adding another component to the party balloon to close the hole, however, could result in an *overall structure* that is substantially airtight. *Id.*

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term ‘inflatable body’ at roughly the same time.” *Id.* at 19–20. Patent Owner contends that “[t]wo district courts in two separate cases involving Petitioners and Patent Owner have construed ‘inflatable body’ as including a ‘substantially airtight’ requirement.” *Id.* at 20.

According to Petitioners, the Texas District Court improperly “construed inflatable body to include a ‘substantially airtight’ requirement by relying on the prosecution history of an unrelated patent, U.S. Patent No. 9,211,018, as intrinsic evidence” in a manner that “is contrary to well-established law.” Pet. 23 (citing Ex. 1072, 9–14). Petitioners assert that “the pertinent evidence . . . undermines such a narrow construction of [‘inflatable body’] in the ’394 Patent.” *Id.*

As noted above, the Texas District Court, in a single *Markman* order, construed “inflatable body” in *both* the ’394 patent and the ’018 patent as a “substantially airtight structure that expands when filled with air or other gases.” Ex. 1072, 14. The Texas District Court stated that “‘inflatable body’ was defined during prosecution, [and] that definition governs,” but then went on to discuss *only* the prosecution history of the ’018 patent—not the ’394 patent. *Id.* at 12–13. Although we acknowledge the considerable experience of the Texas District Court in patent-related matters, having now considered the related application data of the ’394 patent and the ’018 patent, we continue to agree with Petitioners in finding that these two patents are not sufficiently related such that statements in the prosecution history of the ’018 patent would effectively define the common term “inflatable body” in the ’394 patent. *Compare* Ex. 1001, (62), *with* Ex. 2005, (60) (showing no common related applications between the ’394 patent and the ’018 patent); *see* Inst. Dec. 18.

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We reach this determination even assuming the correctness of Patent Owner’s view that the ’018 patent and the ’394 patent “both include an identical Field of Invention, both use many of the same terms (including ‘inflatable body’ in the claims), and both issued from co-pending families which cover mutually relevant subject matter.” PO Resp. 20; *see Abbott Labs. v. Dey, L.P.*, 287 F.3d 1097, 1100, 1104–05 (Fed. Cir. 2002) (determining that the relationship between two patents was “insufficient to render particular arguments made during prosecution of [one of the patents] equally applicable to the claims of [the other patent]” despite “common subject matter, a common inventor, and the same assignee”); *see also Pfizer, Inc. v. Ranbaxy Labs. Ltd.*, 457 F.3d 1284, 1290 (Fed. Cir. 2006) (“[S]tatements made during prosecution of [a] later, unrelated . . . patent cannot be used to interpret claims of [another] patent.”).

The United States District Court for the District of Columbia likewise construed “inflatable body” in the context of U.S. Patent No. 6,793,469 (Ex. 1614, “the ’469 patent”) in the same manner as proposed by Patent Owner. *See* Ex. 2003, 2, 14–15. Even assuming, as asserted by Patent Owner, that the ’469 patent “ha[s] the same specification as the ’018 Patent” (PO Resp. 20), for similar reasons to those discussed above, we do not view the D.C. District Court’s construction in the context of the ’469 patent as indicating that the common term “inflatable body” in the ’394 patent should include a “substantially airtight” requirement. *Compare* Ex. 1001, (62), *with*

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the '469 patent, (63) (showing no common related applications between the '394 patent and the '469 patent); *see Abbott*, 287 F.3d at 1100, 1104–05.¹²

Third, this understanding of “inflatable body” (i.e., as not including a “substantially airtight” requirement) is also supported by certain extrinsic evidence, such as the dictionary definitions provided by Petitioners. *See* Ex. 1059, 3 (defining “inflated” as “[f]illed or distended with air or gas”); Ex. 1060, 3 (defining “inflatable” as “able to be blown up or filled with air or gas”); *see also* Pet. 26 (discussing extrinsic evidence). And, these definitions align with the Specification’s usage of “inflation” and “inflatable,” as discussed above. *See supra* p. 13.

Based on the complete record and for the reasons discussed, we maintain our construction of “inflatable body” from the Institution Decision: a “structure that expands when filled with air or other gases.”

2. “built into”

Independent claims 1 and 16 each recite “a housing *built into* the inflatable body.” Ex. 1001, 8:27, 9:41 (emphasis added). In the Institution Decision, we preliminarily construed “built into” in accordance with its plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” Inst. Dec. 22.

Patent Owner agrees with this construction. *See* PO Resp. 17 (stating that “‘built into’ should be construed as ‘integrated into and not detachable from’” (emphasis omitted)), 16 (stating that the preliminary construction

¹² Moreover, even if the '018 patent or the '469 patent were viewed as sufficiently related to the '394 patent, based on the different claim construction standards in *inter partes* review and district courts, “the board is not generally bound by a prior judicial construction of a claim term.” *See Power Integrations, Inc. v. Lee*, 797 F.3d 1318, 1326 (Fed. Cir. 2015).

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“matches Patent Owner’s proposed definition”). Petitioners did not address this claim term in the claim construction section of the Petition or in the Reply. *See* Pet. 22–28; *see generally* Pet. Reply. Here, the parties agree on the construction of “built into,” but do not agree on the application of that construction to the asserted prior art. *See* Tr. 13:13–14 (counsel for Petitioners stating that the parties “have a disagreement on what th[e] terms [in the construction] mean in their application”), 49:24–50:1 (counsel for Patent Owner stating that “both sides, and the Board, have all agreed that the definition that should be used is integrated into and not detachable from”). We address the disagreements as to the *application* of this construction to the prior art in the discussion of the particular asserted grounds.

Based on the complete record, for the reasons provided in the Institution Decision, we maintain our construction of “built into” in accordance with its plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” *See* Inst. Dec. 19–22.

3. Other Claim Language

Based on the full record developed at trial, the determination as to the alleged obviousness of the Challenged Claims does not turn on the express interpretation of any of the remaining claim terms. Thus, we need not construe explicitly any other claim terms in the context of this proceeding. *See Nidec*, 868 F.3d at 1017.

C. ASSERTED OBVIOUSNESS OF CLAIMS 1–12 AND 16–23 BASED ON WU AND CHAFFEE

Petitioners assert that claims 1–12 and 16–23 of the ’394 patent are unpatentable under 35 U.S.C. § 103(a) based on Wu and Chaffee. Pet. 22,

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34–69; Pet. Reply 1–16. Patent Owner provides arguments specifically addressing this asserted ground. *See* PO Resp. 23–53; PO Surreply 1–14. We begin our analysis with an overview of the asserted prior art and then address the parties’ specific contentions in turn.

1. Wu

Wu is generally directed to a system for controlling air flow into chambers of an air mattress. Ex. 1005, 1:12–14.

Figure 1 of Wu is reproduced below:

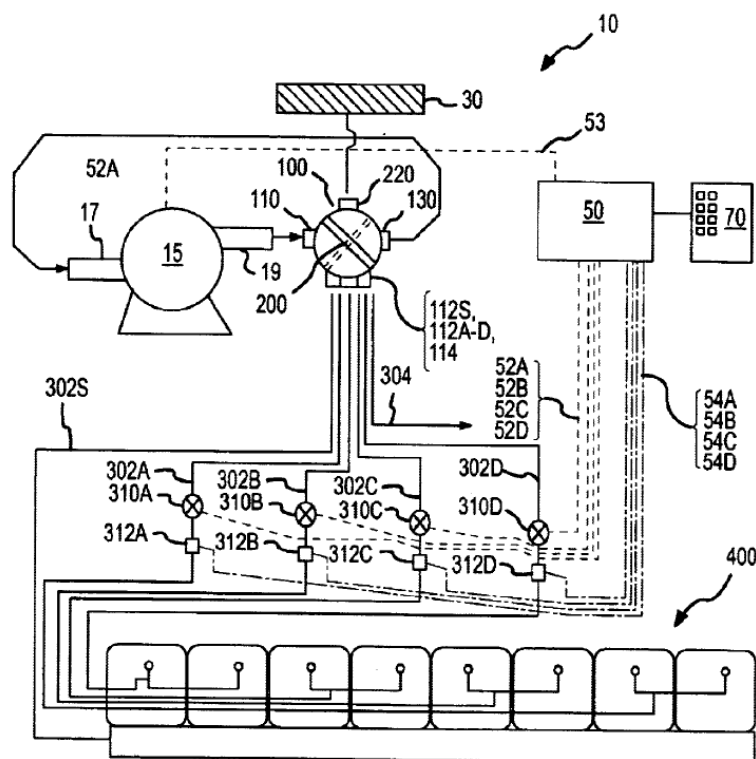


FIG.1

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Figure 1 depicts a schematic representation of the overall disclosed system 10, which includes, among other aspects, electric motor powered blower 15, two-position rotary valve 100, and air mattress supply lines 302A–D and 302S for supplying air to air mattress 400. *Id.* at 2:43–48. Included in rotary valve 100 is gate member 200, which is shown in Figure 1 “in a first position for directing air flow in a pressurizing mode.” *Id.* at 3:3–8. Wu discloses that “[w]hen gate member 200 is in the first position, air can flow through inlet port 110 of housing 101, into the second portion of gate member 200 and then out through air mattress supply ports 112S, 112A, 112B, 112C and 112D and exhaust port 114.” *Id.* at 5:56–60.

The system can be deflated by turning gate member 200 “to a second position shown in phantom” in Figure 1. *Id.* at 4:48–53. According to Wu, “[w]hen in the second position, gate member 200 directs air from air mattress 400 into intake 17 of blower 15 while air leaving blower 15 is directed through filter 30 to the outside environment.” *Id.* at 4:54–57.

Figure 2 is reproduced below:

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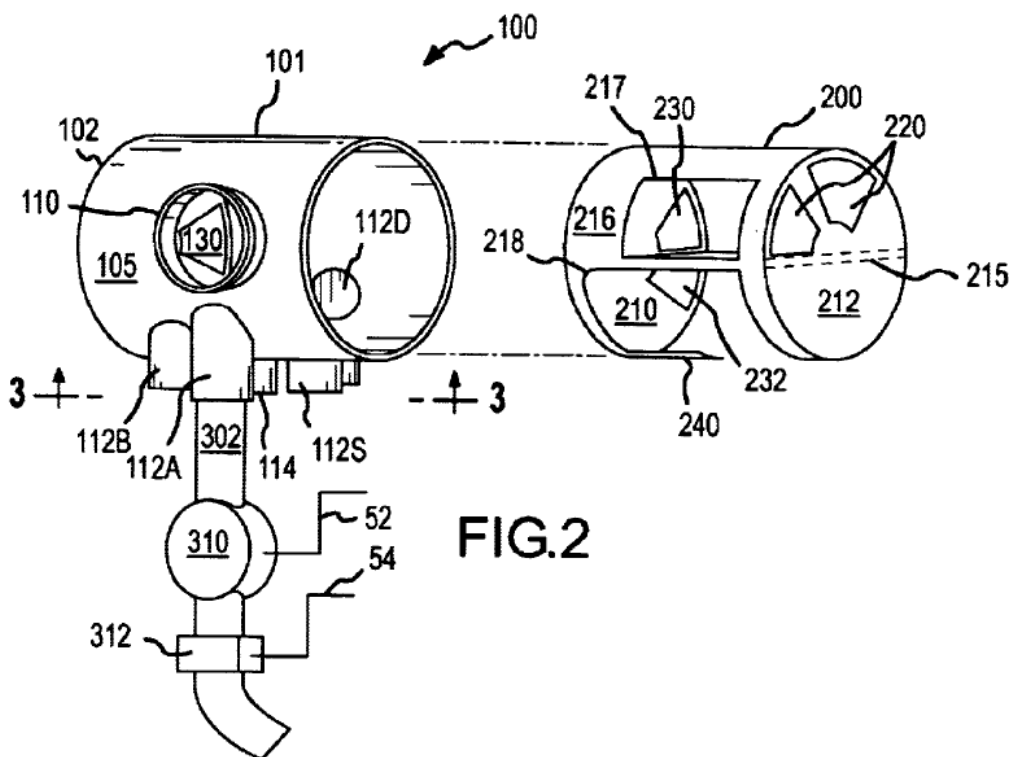


Figure 2 depicts a perspective view of rotary valve 100. *Id.* at 2:36–37, 4:60–61. As shown, rotary valve 100 includes cylindrically shaped valve housing 101 with outer wall 105, which includes inlet port 110 that connects with exhaust port 19 of blower 15. *Id.* at 4:61–66. Outer wall 105 also includes exhaust ports that supply air to air mattress 400's air supply ports. *Id.* at 4:66–5:1.

Gate member 200 fits within valve housing 101 and includes two end walls that close gate member 200 within valve housing 101. *Id.* at 5:9–19. Horizontal wall 215 divides gate member 200 into two sections. *Id.* at 5:19–22. The port arrangement in gate member 200 and valve housing 101 allows the valve to operate in a first position that allows air to be delivered to air mattress 400 and a second position that allows air mattress 400 to be deflated. *Id.* at 5:44–48.

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2. Chaffee

Chaffee relates to “inflatable devices, and, more specifically, to an inflatable device with a recessed fluid controller.” Ex. 1006, 1:13–15.

Figure 2 of Chaffee is reproduced below:

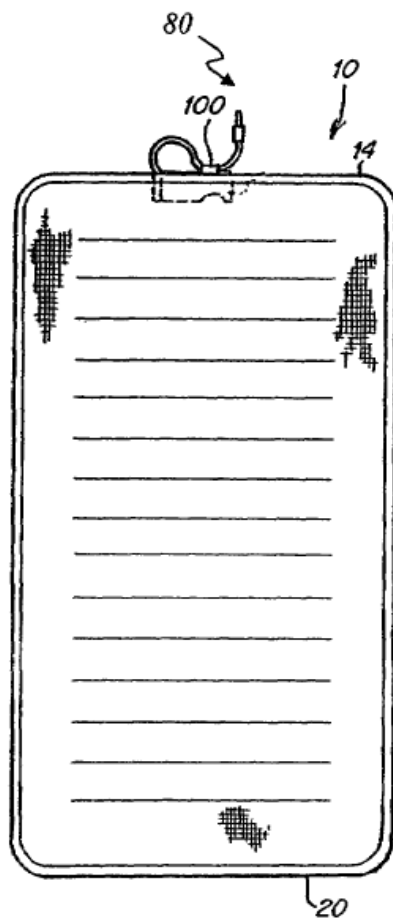


Fig. 2

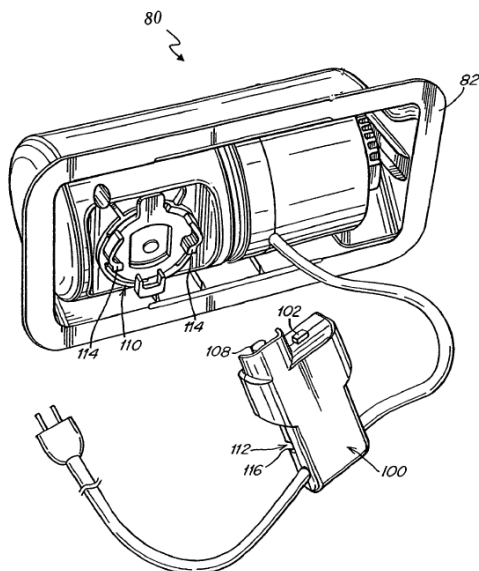
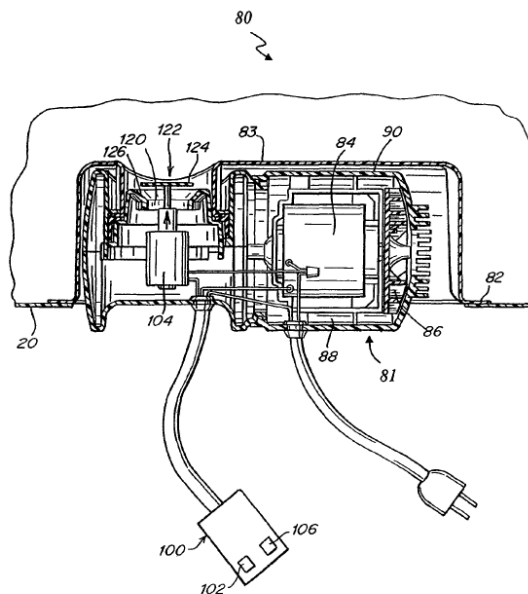
Figure 2 depicts inflatable device 10, which includes, among other aspects, “substantially fluid impermeable bladder 20 and a fluid controller 80 comprising an electrically powered pump at least partly positioned within bladder 20.” *Id.* at 3:3–7. Chaffee discloses that fluid controller 80 “control[s] the flow of fluid into and/or out of bladder 20.” *Id.* at 3:59–61.

Figures 3 and 5 are reproduced below:

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*Fig. 3**Fig. 5*

Figures 3 and 5 depict a perspective view and cross-sectional view, respectively, of one embodiment of fluid controller 80. *See id.* at 2:34–35, 2:38–39. These figures depict, among other aspects, pump 81, flange 82, wall 83, and housing 90. *See id.* at 4:11–17, 5:4–13.

3. Analysis

a. Independent Claim 1

Petitioners contend that the proposed combination of Wu and Chaffee satisfies each of the limitations of claim 1. Pet. 35–60. To support their arguments, Petitioners identify certain passages in the cited references and explain the significance of each passage with respect to the corresponding claim limitation. *Id.* Petitioners also identify reasons why one of ordinary skill in the art at the time of the invention would have been motivated to modify Wu based on Chaffee. *Id.* at 41–51. We address in turn below the subject matter of each limitation in claim 1, then Petitioners' identified

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reasons to modify Wu based on Chaffee, and then objective evidence of nonobviousness.

(1) The “Inflatable Body” Limitation

Claim 1 recites “an inflatable body.”¹³ Ex. 1001, 8:25 (“the ‘inflatable body’ limitation”). Petitioners rely, as the first of three alternatives to address this limitation, on Wu’s disclosure of air mattress 400. Pet. 35 (citing Ex. 1002 ¶ 180; Ex. 1005, Abstract, 2:44–62, 4:37–47, Fig. 1). According to Petitioners, one of ordinary skill in the art “would have understood air mattress 400 to be an inflatable body, as Wu consistently describes air mattress 400 as being a body that is ‘inflated’ by system 10.” *Id.* at 36 (quoting Ex. 1005, 4:1–2) (citing Ex. 1002 ¶ 181; Ex. 1005, Abstract, 3:10–13, 4:14–36). Petitioners provide two other alternatives in the event we construe “inflatable body” to include the “substantially airtight” requirement. *Id.* at 36–37. Because our construction does not include this requirement, we need not consider Petitioner’s alternative arguments.

Patent Owner argues that “air mattress 400 of Wu is clearly not ‘substantially airtight’ since it ‘has a large number of small holes in its upper surfaces to permit air to constantly circulate around a supported patient.’” PO Resp. 48 (quoting Ex. 1005, 2:59–62).¹⁴ This argument is not

¹³ Petitioners take the position that the “preamble [in claim 1] is not a limitation.” Pet. 35 n.3. We agree; here, the body of the claim “sets out the complete invention” such that “the language of the preamble is superfluous.” *Schumer v. Lab. Comput. Sys., Inc.*, 308 F.3d 1304, 1310 (Fed. Cir. 2002).

¹⁴ Although Patent Owner provided arguments as to “inflatable body” in a discussion of a different limitation in claim 1—“a housing built into the inflatable body”—Patent Owner’s arguments address Petitioners’ contentions as to the “inflatable body” limitation.

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convincing because, as discussed above, we do not construe “inflatable body” to include a substantially airtight requirement. *See supra* § II.B.1.

In its Response, Patent Owner does not dispute that Wu’s air mattress 400 satisfies this limitation under the construction adopted above. *See, e.g.*, PO Resp. 48. In the Surreply, however, Patent Owner discusses aspects of the Reply, and argues, *for the first time*, that “Wu doesn’t indisputably meet [the construction of “inflatable body” above] because Wu[’s air mattress 400] is never ‘filled with air’ since it constantly leaks air by design.” PO Surreply 2. As an initial matter, we find this argument untimely; although Patent Owner cites discussion in the Reply (*id.*), Petitioners’ positions as to the construction of “inflatable body” and the reliance on air mattress 400 in Wu (as at least one alternative) were clearly stated in the Petition (*see* Pet. 23–26, 35–37). As such, Patent Owner’s argument should have been made in its Patent Owner Response, not for the first time in its Surreply. *See* Patent Trial and Appeal Board, Trial Practice Guide Update, 15 (August 2018) (“Trial Practice Guide Update”), *available at* <https://go.usa.gov/xU7GP> (“Generally, a reply or sur-reply may only respond to arguments raised in the preceding brief.”); *see also* Office Patent Trial Practice Guide, August 2018 Update, 83 Fed. Reg. 39,989 (Aug. 13, 2018) (notice).

Moreover, we disagree with the merits of this argument. First, the construction requires that the structure “expands when filled with air or other gases,” but this interpretation does not preclude at least *some* leakage. *See supra* p. 16 (stating that “an ‘inflatable body’ must retain air *sufficiently* such that it ‘expands when filled with air or other gases’ as required by our construction”). Second, as noted by Petitioners (Pet. 36), Wu discloses a system for “supplying air to an air mattress 400” in order to support a

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patient. Ex. 1005, 2:45–62, *cited at* Pet. 36. For the reasons above, we find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu discloses the “inflatable body” limitation.

(2) The “Fan and Motor” Limitation

Claim 1 recites “a fan and motor assembly for pumping air.” Ex. 1001, 8:26 (“the ‘fan and motor’ limitation”). To address this limitation, Petitioners state that Wu discloses “‘an electric motor powered variable speed blower’ for ‘supplying air and controlling the flow of air into and out of the chambers of a patient supporting air mattress.’” Pet. 37 (quoting Ex. 1005, Abstract). Petitioners also state that “Wu describes blower (reference numeral 15 [in Figure 1]) as ‘a centrifugal fan type blower.’” *Id.* (quoting Ex. 1005, 2:56–57). According to Petitioners, in Figure 1, “the electric motor is not shown.” *Id.* (citing Ex. 1005, 2:53–55; Ex. 1002 ¶¶ 185–186).

The record evidence, summarized above, supports Petitioners’ position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu discloses the “fan and motor” limitation. Patent Owner does not present arguments for this limitation.

(3) The “Built Into” Limitation

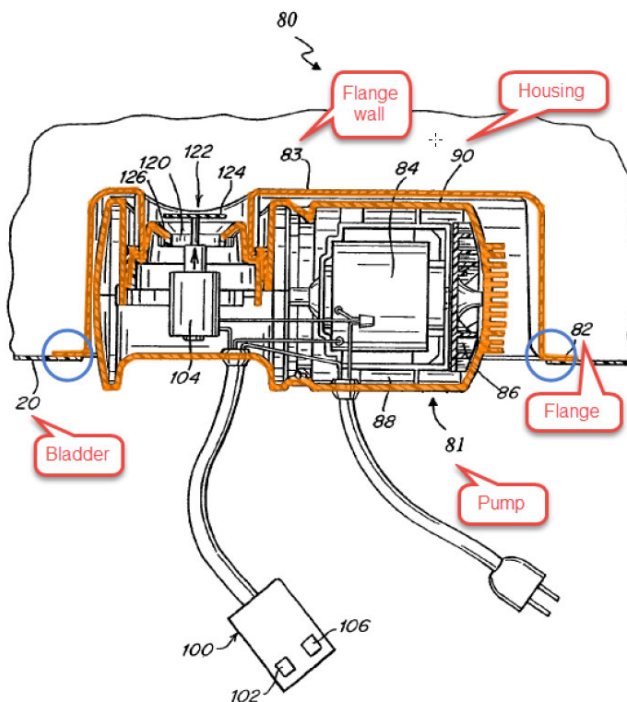
Claim 1 recites “a housing built into the inflatable body.” Ex. 1001, 8:27 (“the ‘built into’ limitation”). Petitioners state that Wu alone does not disclose this limitation, but assert that Wu as modified by Chaffee satisfies this limitation. *See* Pet. 38 (stating that Wu does not disclose this limitation); *see also id.* at 38–41 & 45–51 (discussing this limitation).

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Petitioners identify flange 82, flange wall 83, and housing 90 in Chaffee, collectively, as a “housing” and identify bladder 20 as an “inflatable body.” *Id.* at 40 (“To be clear, flange 82 and flange wall 83 are part of the housing 90 (collectively ‘Chaffee’s Housing’) and, collectively, constitute the claimed ‘housing.’” (citing Ex. 1006, 4:15–17, 4:19–22; Ex. 1002 ¶¶ 189–191, 200–202)); Pet. 45 (“Chaffee’s Housing is built into an inflatable body.”). Petitioners provide the following annotated version of Figure 5 of Chaffee, with (1) the three identified structural elements of “Chaffee’s Housing” (as depicted in the Figure 5 embodiment) overlaid in orange and identified with text boxes, (2) bladder 20 as well as pump 81 identified with text boxes, and (3) blue circles added around the “connection point[s]” between the identified “housing” and bladder 20:

*Fig. 5*

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Pet. 47. Figure 5 of Chaffee depicts “a top, cross-sectional view of one embodiment.” Ex. 1006, 2:38–39. Referring to Figures 2 and 5 of Chaffee, Petitioners state that “Chaffee disclosed that fluid controller 80, through its Housing [(i.e., elements 82/83/90)], is built into and recessed in inflatable bladder 20.” Pet. 45 (citing Ex. 1002 ¶ 198); *see also id.* at 46 (providing annotated versions of Figures 2 and 5 of Chaffee). Petitioners state that the three identified structural elements in Chaffee were “connected to its bladder by, for example, ‘adhesive or heat seal’ (Chaffee 4:67–5:2, 5:26), which a [person of ordinary skill in the art] would have understood to be a built in connection between flange 82 and bladder 20.” Pet. 47 (citing Ex. 1002 ¶ 201; Ex. 1072, 23–24). According to Petitioners, in view of these disclosures in Chaffee, one of ordinary skill in the art “would have been motivated to contain Wu’s pump components (e.g., blower 15 and rotary valve 100), in a housing (e.g., as taught by Chaffee’s Housing), such that the housing was built into Wu’s inflatable body (e.g., air mattress 400)” for reasons we will discuss below. *See id.* at 48 (citing Ex. 1002 ¶ 203).

Patent Owner argues that Chaffee does not disclose the “built into” limitation and thus, even if combined, Wu and Chaffee do not satisfy this limitation. PO Resp. 26–36, 50–53; PO Surreply 6–11. We first address arguments related to the disclosures in Chaffee and then turn to arguments related to its prosecution history.

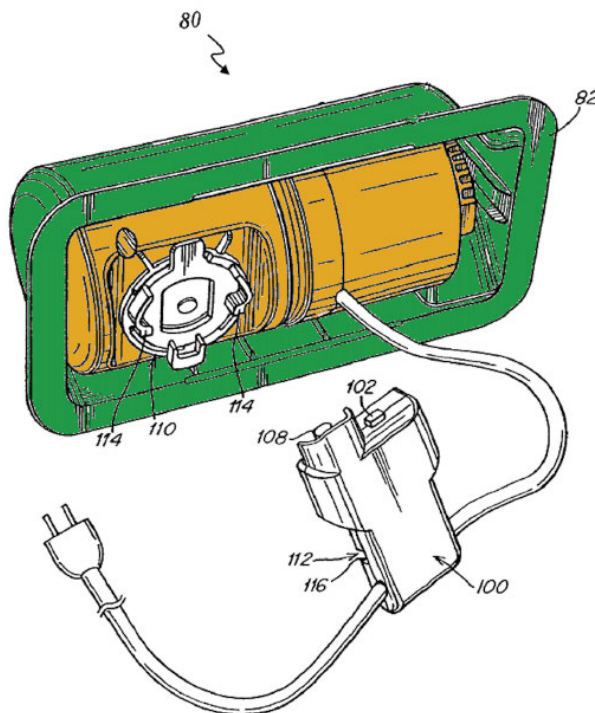
Patent Owner asserts that at least portions of the identified “housing” (i.e., elements 82/83/90) in Chaffee are removable from bladder 20, and thus, the “housing” fails to satisfy the “not detachable from” requirement of

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the “built into” limitation.¹⁵ PO Resp. 50–53. Specifically, Patent Owner argues that, in Chaffee, “if anything is ‘built into’ the wall of the bladder [20], it is flange 82,” but, according to Patent Owner, “flange 82 is separate from the housing 90.” *Id.* at 51. In support, Patent Owner provides the following annotated version of Figure 3 of Chaffee, with flange 82 shown in green and housing 90 shown in orange:

*Fig. 3*

PO Resp. 52; *see id.* at 35–36 (arguing that Figures 3–5 “all reflect a removable pump housing (orange) separate from the flange (green)”). Figure 3 depicts “a perspective, plan view of a fluid controller according to one embodiment.” Ex. 1006, 2:34–35. According to Patent Owner,

¹⁵ As discussed above, we construe “built into” in accordance with its plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” *See supra* § II.B.2.

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Chaffee explains that the reason why the housing 90 and flange 82 are separate pieces and should be reversibly connected is to allow *“the removal of portions of fluid controller 80 for repair or replacement, preventing the entire inflatable device from having to be disposed of in the event of a failure of one component.”*

PO Resp. 53 (quoting Ex. 1006, 5:44–48, with emphasis added by Patent Owner); *see id.* at 52–53 (discussing Ex. 1006, 5:22–26, 5:33–35). Patent Owner contends, “Chaffee says that if the fluid controller 80 is not in two pieces, the entire thing (which would include flange 82 if flange 82 exists in that embodiment) is still removable from the bladder. (Ex. 1006, 5:38–47 (‘In either case, the reversible connection allows removal.’).” *Id.* at 53.

In their Reply, Petitioners contend that Patent Owner’s argument addresses “Chaffee’s description of an *alternative* embodiment in which flange 82 and housing 90 are separate but connected” structures. Pet. Reply 6. Petitioners argue that statements such as those at column 5, lines 33 to 35¹⁶ “demonstrate that Chaffee contemplated another design in which flange 82 and housing 90 were not separate, connectable structures but, rather, different portions of the same structure.” *Id.* (citing Ex. 1625 ¶ 42). According to Petitioners, “Chaffee confirms this by stating ‘[f]lange 82 may, for example, extend from housing 90 or may be a separate component connected to housing 90.’” *Id.* (quoting Ex. 1625 ¶ 40 (quoting Ex. 1006, 5:7–9) (emphasis added in Ex. 1625)) (citing Ex. 1625 ¶¶ 39, 43).

¹⁶ “*Where flange 82 connects to housing 90 or another portion of fluid controller 80, it is preferred that such connection be reversible.*” Pet. Reply 6 (quoting Ex. 1006, 5:33–35, with emphasis added by Petitioners) (citing Ex. 1625 ¶¶ 41–43).

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Dr. Stevick testifies that “or” in the sentence at column 5, lines 7 to 9 of Chaffee means “said another way.” Ex. 1602, 611:15; *see also id.* at 610:21–611:5 (stating that with “or,” Chaffee is “repeating what he means”), 608:25–609:2 (stating that Chaffee uses “or” “to say it another way to be more clear”); Ex. 2029 ¶¶ 38, 94, 129–136 (testifying that flange 82 must be separate from housing 90). In contrast, Petitioners’ expert, Dr. Beaman, testifies that “or” indicates two “alternative designs.” Ex. 1625 ¶ 40, *cited at* Pet. Reply 6–7. Although the word “or” can, in some instances, have the meaning identified by Dr. Stevick, the word “or” in the sentence at issue is used in the disjunctive sense, i.e., to indicate that what precedes it is different from, or an alternative to, what follows. *See, e.g., SkinMedica, Inc. v. Histogen Inc.*, 727 F.3d 1187, 1199–1200 (Fed. Cir. 2013) (discussing how the use of a disjunctive “or” in a specification indicates alternatives). Based on this interpretation, we understand Chaffee to disclose at least two *different* embodiments: (1) an embodiment in which flange 82 and housing 90 (as well as wall 83) are different portions of the *same* structural component and (2) an embodiment in which flange 82 and housing 90 are separate, but connected, components. *See* Ex. 1006, 5:7–11; Ex. 1625 ¶ 40. Considering the record as a whole, we credit the testimony of Dr. Beaman over that of Dr. Stevick on this issue because Dr. Beaman’s view is consistent with our understanding of Chaffee.

We turn now to the meaning of “extends from” in column 5, line 7 to 9 of Chaffee. We agree with Patent Owner that merely stating that flange 82 “extend[s] from” housing 90 does not, *by itself*, indicate whether the flange and housing are part of the same structural component or whether they are separate, but connected. *See* PO Resp. 26–27 n.4 (citing Ex. 2040, 268:12–

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272:3); PO Surreply 9 (stating that “Dr. Beaman agreed that ‘extends from’ does not necessarily refer to one piece”). Patent Owner’s view, however, analyzes “extends from” in a vacuum rather than in the context of Chaffee overall. *See* Ex. 1625 ¶ 43 (“As I testified, the ‘extend[s] from’ language in Chaffee must be read in context, as any [person of ordinary skill in the art] would do.” (citing Ex. 2040, 268:22–269:2, 269:6–8, 270:5–9)), *cited at* Pet. Reply 6–7. In context and for the reasons discussed above, we understand the presence of a disjunctive “or” in the same sentence to indicate that the disclosure that flange 82 may “extend from” housing 90—which precedes the “or”—would be understood as *different* from (i.e., an alternative to) the disclosure that flange 82 “may be a separate component connected to housing 90”—which follows the “or.” *See* Ex. 1006, 5:7–9.

As argued by Petitioners (Pet. Reply 6–7), Patent Owner focuses on disclosures related to embodiments in which flange 82 and housing 90 are *separate but connected*. *See* PO Resp. 52–53 (discussing Ex. 1006, 5:22–26 (disclosing that “flange 82 may be constructed of a material that is more flexible than housing 90”), 5:33–35 (“*Where flange 82 connects to housing 90 or another portion of fluid controller 80, it is preferred that such connection be reversible.*” (emphasis added)), 5:44–48 (discussing how “*the reversible connection* [discussed in the prior quotation] allows the removal of portions of fluid controller 80 for repair or replacement” (emphasis added))). For example, we view the terms “connects to” and “connection” in two of the disclosures relied on by Patent Owner (*see* Ex. 1006, 5:33–35, 5:44–48, *quoted at* PO Resp. 53) as referring back to the initial disclosure of an embodiment in which flange 82 “may be a separate component *connected*

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to housing 90” (Ex. 1006, 5:7–9 (emphasis added)). *See* Pet. Reply 6 (citing Ex. 1625 ¶ 42).

In addition, we view the phrase “[i]n either case” (Ex. 1006, 5:44) as referring to two possible “reversible connection[s]” (Ex. 1006, 5:43–44), both of which *fall within the scope* of the initial disclosure of an embodiment in which flange 82 “may be a separate component connected to housing 90” (Ex. 1006, 5:7–9): one version in which housing 90 can disconnect from flange 82 (*id.* at 5:33–35) and another version in which the *entire* fluid controller 80 (which includes flange 82 and housing 90) can disconnect from bladder 20 (*id.* at 5:41–44). Based on the understanding discussed above of Chaffee’s disclosure that flange 82 may, for example, “extend from” housing 90, we do not agree with Patent Owner’s position that Chaffee *only* discloses embodiments in which at least one portion of the identified “housing” is removable from bladder 20. *See* PO Resp. 53.

We do agree with Patent Owner’s argument, however, that Figure 5 of Chaffee does not necessarily depict an embodiment in which flange 82 and housing 90 (as well as wall 83) are different portions of the *same* structural component. *See* PO Resp. 34–35 (citing Ex. 2029 ¶¶ 91–93). That said, the *disclosures* of Chaffee are not limited to the *depictions* in the figures. And here, Petitioners have clearly relied on the statement at column 5, lines 7 to 9 of Chaffee to support their position as to the “built into” limitation. Pet. 39–40, 46; Pet. Reply 6–7.

We turn now to arguments based on Chaffee’s prosecution history. Patent Owner argues that, in light of the prosecution history, one of skill in the art would not have understood Chaffee to disclose the embodiment relied on by Petitioners (as discussed above). PO Resp. 26–34, 36; PO Surreply 6–

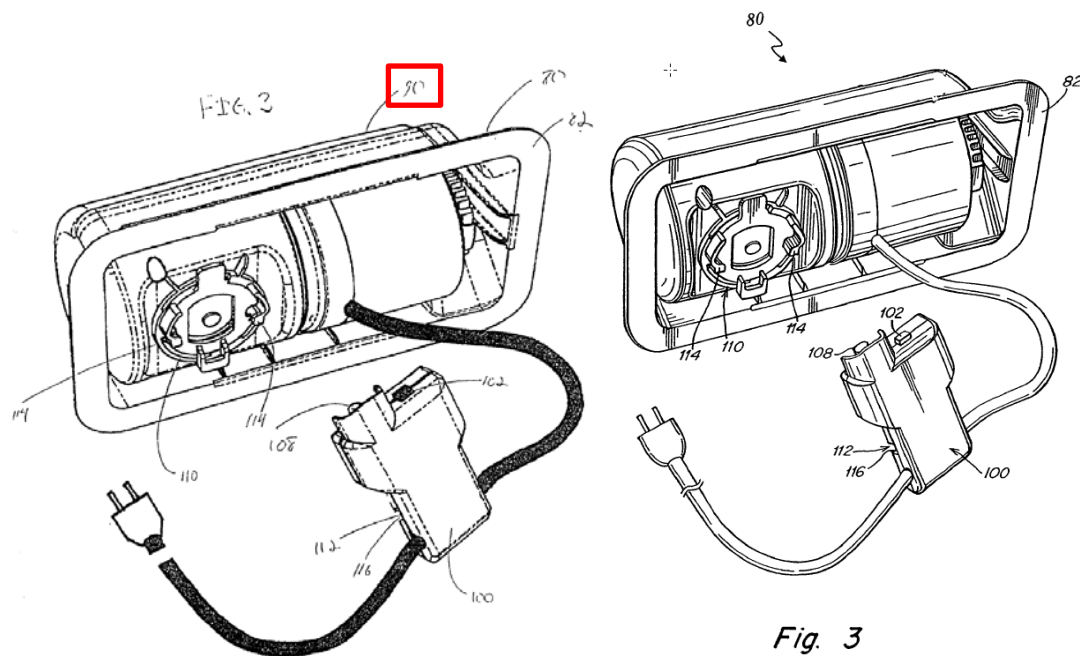
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7, 9–11. Patent Owner also argues that amendments to the original figures remove Chaffee as prior art in this proceeding. *Id.* We discuss each position in turn, after a background of the relevant events from the prosecution history of Chaffee, which are not in dispute.

Chaffee issued on May 9, 2006, from U.S. Patent Application No. 09/859,706 (the “’706 application”), filed on May 17, 2001. *See* Ex. 1006, (45), (21), (22). Original Figures 3 and 4 filed with the ’706 application had an additional reference numeral “90” not present in the issued version of Chaffee. Original Figure 3 and issued Figure 3 are reproduced below with a red box added to identify around the additional reference numeral “90” in Original Figure 3:



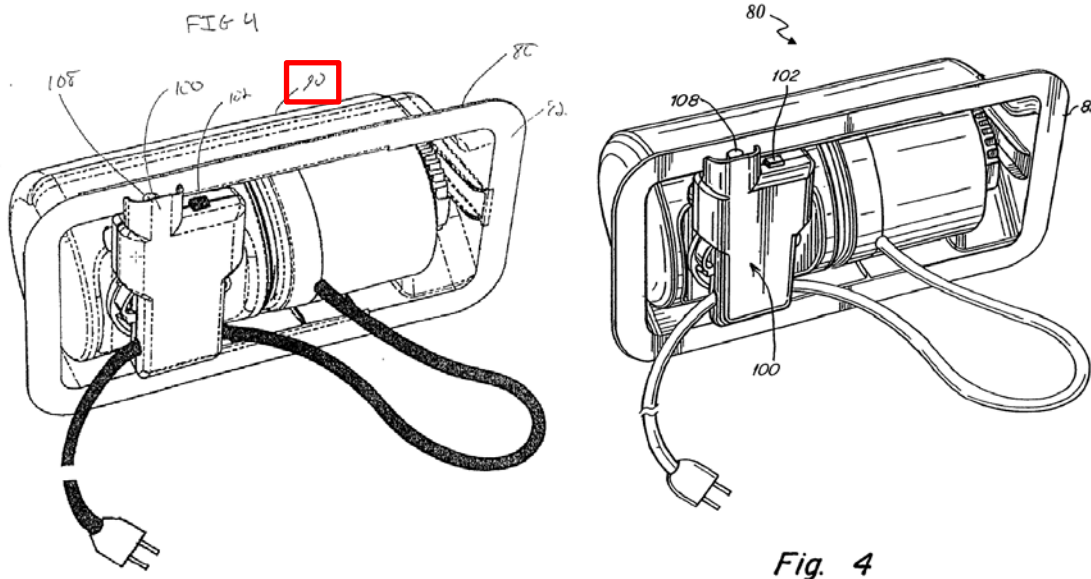
Ex. 2041 (file history of the ’706 application), 19; Ex. 1006, Fig. 3. Figure 3 depicts a perspective view of one embodiment of fluid controller 80. *See* Ex. 1006, 2:34–35.

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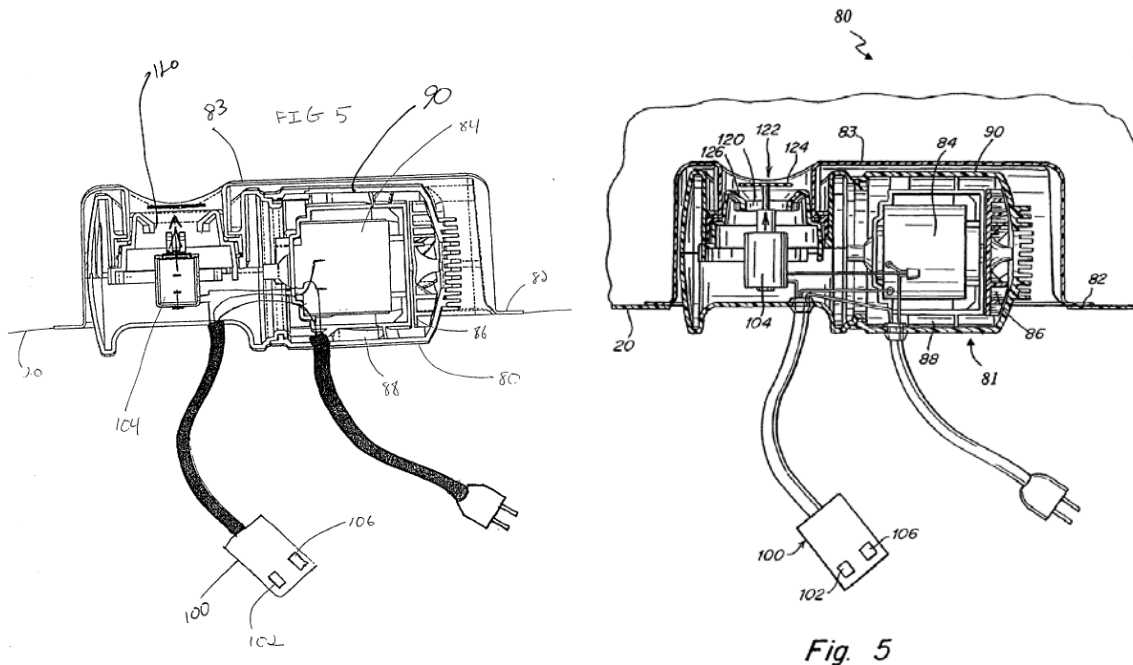
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Original Figure 4 and issued Figure 4 are reproduced below with a red box added to identify the additional reference numeral “90” in Original Figure 4:



Ex. 2041, 20; Ex. 1006, Fig. 4. Figure 4 depicts a perspective view of one embodiment of fluid controller 80. *See* Ex. 1006, 2:36–37.

Original Figure 5 and issued Figure 5 are reproduced below:



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Ex. 2041, 21; Ex. 1006, Fig. 5. Figure 5 depicts a cross-sectional view of one embodiment of fluid controller 80. *See* Ex. 1005, 2:38–39. Mr. Chaffee filed formal drawings in December 2002, which included the additional reference numerals “90” from the original drawings. *See* Ex. 2041, 116–21.

In an Office Action dated September 7, 2005, the examiner objected to the drawings:

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character “90” has been used to designate both the housing (90) connected to the flange (82) as shown in Fig. 3 and the housing or covering around the motor (84), impeller (86), conduit (88), solenoid (104), etc. as shown in Fig. 5. There appear[] to be two different structures which Applicant is referring to as a “housing” and these two different structures are being confused with each other. Each of the two different structural elements should be given a separate reference numeral.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference numerals “83” and “90” have both been used to designate “fluid impermeable wall” (see Fig. 5) and “housing” (see Fig. 3).

Ex. 2041, 448–49. In response, Mr. Chaffee modified the then-pending Figures 3 and 4 by deleting the additional reference numerals “90.” *See id.* at 498–99 (showing revisions to Figures 3 and 4 in an Amendment, dated December 7, 2005), 542–43 (showing revisions to Figures 3 and 4 in a Supplemental Amendment, dated December 8, 2005). In discussing these amendments, Mr. Chaffee stated: “Applicant has deleted reference character 90 from FIGS. 3 and 4 of the enclosed annotated drawings so as to eliminate any confusion.” *Id.* at 491 (Amendment), 533 (Supplemental Amendment).

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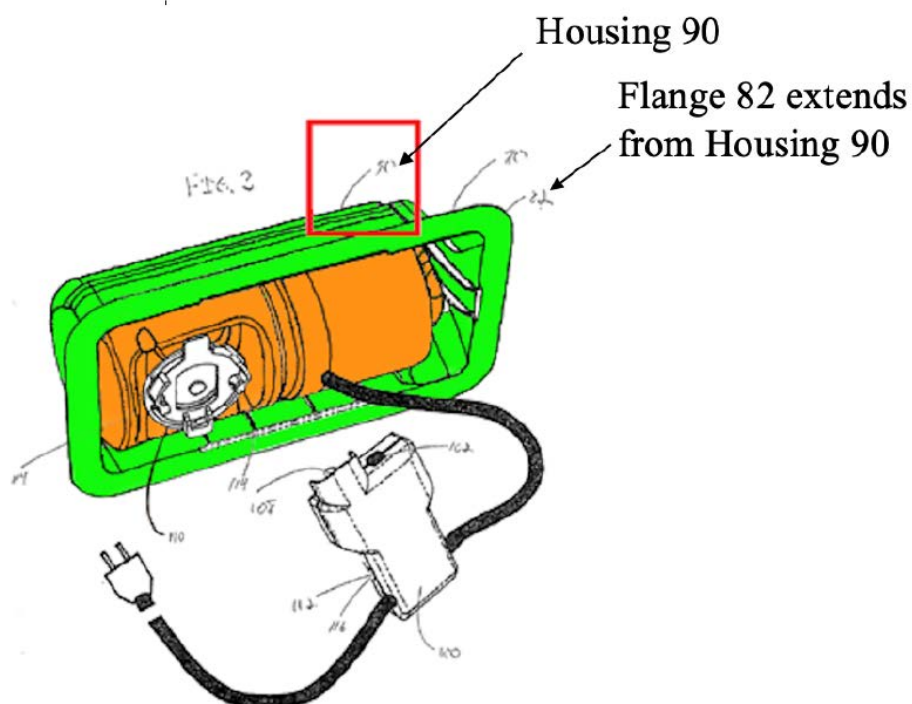
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With that background, we turn to Patent Owner’s arguments. Patent Owner contends that original Figures 3 and 4 “explain how the ‘extend from housing 90’ phrase [(Ex. 1006, 5:8)] was not a teaching of a one-piece ‘Chaffee Housing’ as Petitioners allege, but rather a literal description of FIGS. 3–4 as they were originally filed.” PO Resp. 27 (citing Ex. 2029 ¶¶ 76–77). According to Patent Owner,

Chaffee’s original disclosure is evidence that the “extend from” phrase of Chaffee 5:7–9 is a direct reference to the green “housing” “90” structure of FIG. 3 as filed, which is fluid impermeable wall 83 in [Chaffee as issued]. ***It is not a teaching that a flange extends from the orange pump housing as Petitioners contend.***

PO Resp. 33. In support, Patent Owner provides the following annotated version of original Figure 3 of Chaffee:



PO Resp. 32–33. The annotated version of original Figure 3 of Chaffee directly above shows (1) an outer structure overlaid in green, (2) an inner

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structure overlaid in orange, (3) a red box around additional reference numeral “90” with a text box stating “Housing 90” pointing to the same, and (4) a text box stating “Flange 82 extends from Housing 90” pointing to reference numeral 82. *Id.* at 33.

We are not persuaded by Patent Owner’s argument that the prosecution history of Chaffee undermines the understanding of “extend from” (Ex. 1006, 5:7–9) discussed above. As an initial matter, to the extent Patent Owner relies on the subjective intent of Mr. Chaffee during drafting, the proper analysis looks at how one of ordinary skill in the art at the time of the invention would have understood the relied-upon disclosures in the Chaffee patent. *See* PO Resp. 33 (“Had Chaffee’s attorney intended the orange pump housing to be one piece with flange 82, he could have argued that the orange and green housings were one and the same and would not have deleted character ‘90.’ He did not argue that they were the same.”); *cf.* *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1372–73 (Fed. Cir. 2019) (affirming an obviousness determination in an *inter partes* review in which a first prior art reference disclosed all of the claim limitations and a second prior art reference was used to “demonstrate that a person of ordinary skill in the art would have understood” that a teaching in the first reference satisfied a claim limitation); *see also KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (stating that the obviousness “analysis is objective”).

In addition, the complete record developed at trial does not support Patent Owner’s position as to the meaning of “[f]lange 82 may, for example, extend from housing 90.” Ex. 1006, 5:7–9. First, as noted by Petitioners (Pet. Reply 7), the text in Chaffee (i.e., the written description) has consistently used reference numeral “90” to refer to a “housing[] that

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surrounds the inner workings of the pump” and can “provide a connection between fluid controller 80 and bladder 20” by, e.g., flange 82 extending therefrom. *Compare* Ex. 2041, 8:5–8, 9:9–12,¹⁷ *with* Ex. 1006, 4:17–22, 5:4–9; Ex. 1006, 5:7–8. Mr. Chaffee’s statements filed with the drawing amendments at issue further support this understanding:

It is clear from the specification that the reference character 90 refers to the housing 90 that surrounds the inner workings of the pump 81, such as the motor (84), impeller (86), conduit (88), solenoid (104), etc., and can also serve as a connection between the fluid controller 80 and the bladder 20.

Ex. 2041, 491 (Amendment), 533 (Supplemental Amendment) (same), *quoted at* Pet. Reply 8.

Second, as also noted by Petitioners (Pet. Reply 7), the labelling in original Figure 5 in Chaffee—and issued Figure 5—remained unchanged as to housing 90, and consistently supported the understanding of housing 90 as a structure surrounding the inner workings of the pump (rather than identifying the structure referred to as wall 83 in Chaffee as issued).¹⁸ *See* Ex. 2041, 21 (original Figure 5), 119 (formal version of original Figure 5), 500 (showing revisions in Amendment), 544 (same in Supplemental Amendment), 508 (showing issued version in Amendment), 552 (same in Supplemental Amendment); Ex. 1006, Fig. 5, 5:10–11 (discussing “fluid impermeable wall 83”). In light of the complete record, we find that one of

¹⁷ These citations to Exhibit 2041 refer to the page numbers added for this proceeding, not the internal pagination.

¹⁸ As discussed above, however, we agree with Patent Owner that Figure 5 does not necessarily depict an embodiment in which flange 82 and housing 90 (as well as wall 83) are different portions of the *same* structural component. *See supra* p. 36.

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ordinary skill in the art would have understood housing 90 as a structure that “surrounds the inner workings of the pump” and can “provide a connection between fluid controller 80 and bladder 20” by (in one embodiment) flange 82 extending from housing 90 as a different portion of the same structural component.

We turn now to Patent Owner’s argument that the amendments discussed above remove Chaffee as prior art in this proceeding. PO Resp. 26–34, 36; PO Surreply 6–7, 9–11. Relevant to this issue, Petitioners state: “Chaffee is prior art under 35 U.S.C. § 102(e) as it stems from a nonprovisional application (Application No. 09/859,706) that was filed on May 17, 2001 (*see generally* Ex. 1006), which precedes the June 22, 2001 Priority Date of the ’394 Patent.” Pet. 41 n.4. As noted above, the amendments were filed in December 2005. Patent Owner argues that, by deleting the reference numerals “90” from original Figures 3 and 4, Mr. Chaffee “attempted to redefine housing 90 as the housing that ‘surrounds the inner workings of the pump 81 [‘81’ was simultaneously newly added to FIG. 5 to replace ‘80.’].” PO Resp. 33 (citing Ex. 2041, 491, 500) (bracketed text added by Patent Owner). Patent Owner notes that the amendments “were made starting in 2005, years after the 2001 effective filing date of the ’394 Patent.” *Id.* Patent Owner then concludes that Chaffee “is *not a proper printed publication* for challenging the ’394 Patent claims because its disclosure was modified years after the effective filing date of the ’394 Patent.” *Id.* at 36 (citing Ex. 2029 ¶¶ 95–96).

As an initial matter, we are not persuaded that, with the amendments, Mr. Chaffee “redefined” housing 90. Instead, for the reasons discussed above (*see supra* pp. 39–42), the record supports Petitioners’ argument that

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the amendments merely aligned Figures 3 and 4 with the rest of the specification as to housing 90. Pet. Reply 8–9. Further, we understand Patent Owner to contend that the amendments constitute new matter and that, based on that alleged new matter, the effective filing date of Chaffee is now in December 2005, which would post-date the effective filing date of the '394 patent. *See, e.g., Nat. Alt. Int'l v. Iancu*, 904 F.3d 1375, 1383 (Fed. Cir. 2018) (discussing how new matter added during prosecution can change the effective filing date of a prior art reference); *see also* PO Surreply 10 (stating that “[n]ew matter is a basis for forfeiting an effective filing date”). Patent Owner argues that the amendments “are not immaterial” and that “[t]here is no support . . . for deleting reference numbers on figures without changing scope.” PO Surreply 10.

Petitioners argue persuasively that Patent Owner does not adequately explain *why* the amendments amount to new matter. *See* Pet. Reply 8 (contending that this argument is “undeveloped” and “ cursory” and that Patent Owner has not “articulated a cognizable new matter argument”). Patent Owner cites to the testimony of Dr. Stevick on this issue, but Dr. Stevick essentially restates Patent Owner’s argument. *Compare* Ex. 2029 ¶¶ 95–96, *with* PO Resp. 36; 37 C.F.R. § 42.65(a). For the same reasons discussed above, Petitioners present sufficient arguments and evidence to support a finding that the amendments merely removed clerical errors in the original drawings to align those drawings with the rest of the specification as to housing 90, and thus, did not constitute new matter. *See* Pet. Reply 8–9.¹⁹ As noted by Petitioners, the examiner did not issue a new

¹⁹ For similar reasons, we do not agree with Patent Owner that the amendments rendered Chaffee “ambiguous.” PO Surreply 11.

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matter objection in the wake of the amendments. *See id.* at 9 (citing *Commonwealth Sci. v. Buffalo Tech.*, 542 F.3d 1363, 1380 (Fed. Cir. 2008)).

For the reasons above, we find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu as modified by Chaffee discloses the subject matter of the “built into” limitation.²⁰

(4) The “Interior Region” Limitation

Claim 1 recites “the housing having an interior region”. Ex. 1001, 8:27–28 (“the ‘interior region’ limitation”). Petitioners acknowledge that Wu alone does not disclose this limitation, but assert that Wu as modified by Chaffee satisfies this limitation. Pet. 38 (stating that Wu does not disclose this limitation), 38–45. As discussed in the prior section, Petitioners identify flange 82, flange wall 83, and housing 90 in Chaffee, collectively, as a “housing.” *Id.* at 40 (citing Ex. 1006, 4:15–17, 4:19–22; Ex. 1002 ¶¶ 189–191, 200–202) (“To be clear, flange 82 and flange wall 83 are part of the housing 90 (collectively ‘Chaffee’s Housing’) and, collectively, constitute the claimed ‘housing.’”).

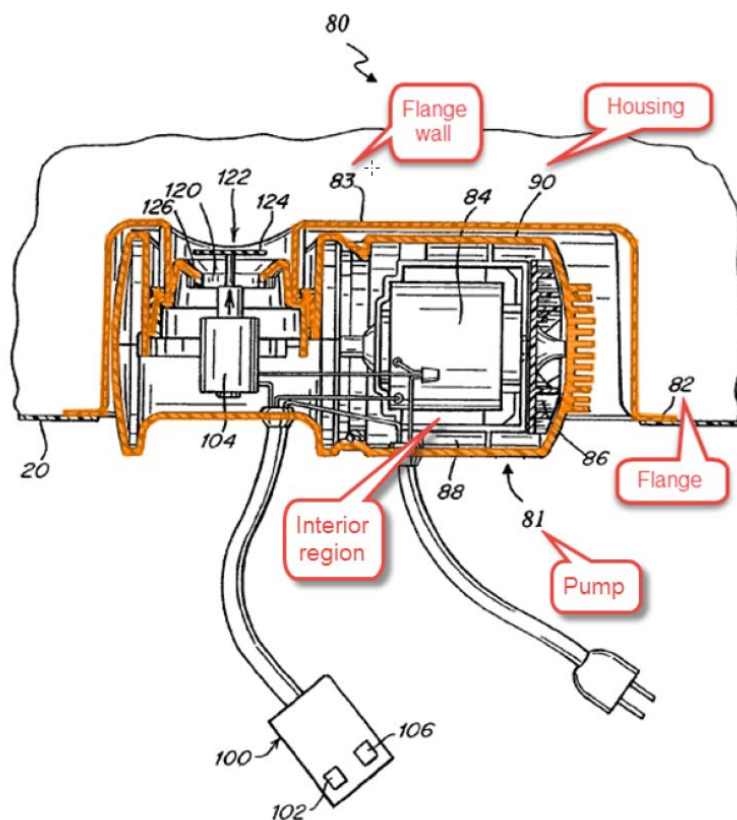
Petitioners provide the following annotated version of Figure 5 of Chaffee, with (1) the three identified structural elements making up “Chaffee’s Housing” overlaid in orange and identified with text boxes, (2) pump 81 identified with a text box, and (3) an “Interior region” identified:

²⁰ We address below Patent Owner’s arguments that one of ordinary skill in the art would not have modified Wu based on Chaffee as proposed. *See infra* § II.C.3.a.7.

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*Fig. 5*

Pet. 42. Figure 5 of Chaffee depicts “a top, cross-sectional view of one embodiment.” Ex. 1006, 2:38–39. Petitioners state that “Chaffee’s Housing has an interior region that . . . ‘surrounds the inner workings of the pump [81].’” Pet. 41 (quoting Ex. 1006, 4:18–19). According to Petitioners, one of ordinary skill in the art “would have been motivated to dispose Wu’s pump components—*i.e.*, rotary valve 100 and motorized blower 15—inside a housing (as taught by Chaffee)” for reasons we will discuss below. *See id.* at 42 (citing Ex. 1002 ¶ 192).

The record evidence, summarized above, supports Petitioners’ position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance

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of the evidence that Wu as modified by Chaffee discloses the subject matter of the “interior region” limitation. Patent Owner does not dispute that Wu as modified by Chaffee discloses the subject matter of this limitation.²¹

(5) The “Air Conduit” Limitation

Claim 1 recites:

an air conduit disposed at least in part in the housing, the air conduit being movable between a first position and a second position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position.

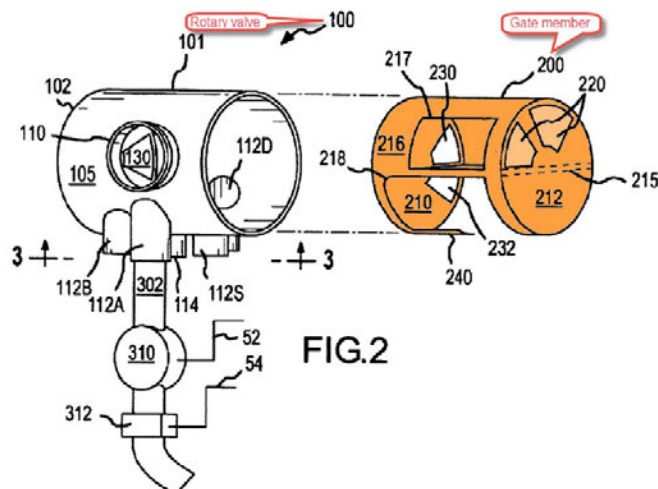
Ex. 1001, 8:29–35 (“the ‘air conduit’ limitation”). Petitioners state that Wu as modified by Chaffee satisfies this limitation. Pet. 51 (citing Ex. 1002 ¶ 214), 59 (citing Ex. 1002 ¶ 230). Petitioners provide the following annotated version of Figure 2 of Wu, which adds (1) text boxes identifying rotary valve 100 and gate member 200 and (2) orange overlay to gate member 200.

²¹ We address below Patent Owner’s arguments that one of ordinary skill in the art would not have modified Wu based on Chaffee as proposed. *See infra* § II.C.3.a.7.

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Pet. 52. Figure 2 depicts a perspective view of rotary valve 100. Ex. 1005, 2:36–37, 4:60–61. According to Petitioners, “in combination with Chaffee’s Housing teachings, Wu’s rotary valve 100, including gate member 200, would be contained in a housing” such that, “in combination with Chaffee, Wu’s gate member 200 (the movable air conduit) is disposed in the housing.” Pet. 52 (citing Ex. 1002 ¶ 216).

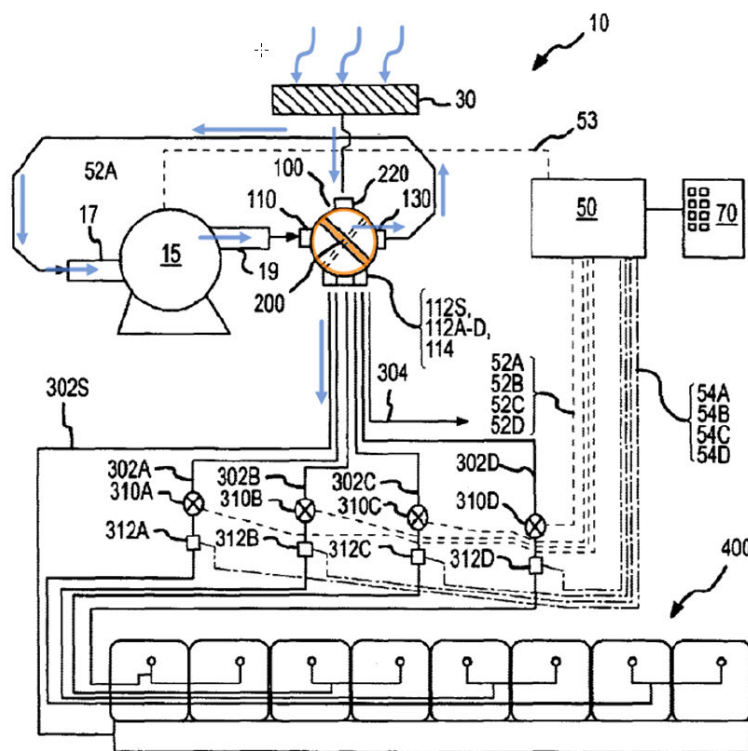
Petitioners argue that “Wu’s gate member 200 (the air conduit) has a first position for inflation.” Pet. 52 (citing Ex. 1005, 3:3–6; Ex. 1002 ¶ 217).

Petitioners provide the following annotated version of Figure 1 of Wu, which adds (1) blue arrows showing the direction of air flow in the inflation configuration and (2) orange overlay to portions of gate member 200.

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**FIG.1**

Pet. 54. Figure 1 depicts a schematic representation of the overall disclosed system 10. Ex. 1005, 2:43–48. Referring to annotated Figure 1 above, Petitioners highlight Wu’s disclosure that when “gate member 200 [orange] is in the first, pressurizing position, air [blue] from blower 15 is routed to air mattress 400 shown in FIG. 1, while outside air [blue] is drawn in through filter 30 shown in FIG. 1 and into the intake of blower 15.” Pet. 53 (quoting, with bracketed text added by Petitioners, Ex. 1005, 5:67–6:4) (citing Ex. 1005, Fig. 2; Exs. 1068, 1070; Ex. 1002, ¶¶ 218–222). Petitioners argue that “Wu’s air conduit/gate member 200 has a second position for deflation.” *Id.* at 56 (citing Ex. 1005, 5:44–48; Ex. 1002 ¶ 223). Petitioners provide the following additional annotated version of Figure 1 of Wu, which adds

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Pet. 57. Figure 1 depicts a schematic representation of the overall disclosed system 10. Ex. 1005, 2:43–48. Referring to annotated Figure 1 above, Petitioners highlight Wu’s disclosure that when “in the second position, gate member 200 directs air [blue arrows] from air mattress 400 into intake 17 of blower 15 while air leaving blower 15 is directed through filter 30 to the outside environment.” Pet. 56 (quoting, with bracketed text added by Petitioners, Ex. 1005, 4:54–59) (citing Ex. 1005, Fig. 2; Exs. 1069, 1070; Ex. 1002 ¶¶ 224–229).

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of the evidence that Wu as modified by Chaffee discloses the subject matter of the “air conduit” limitation. Patent Owner does not dispute that Wu as modified by Chaffee discloses the subject matter of this limitation.

(6) The “Wherein” Limitation

In the final clause, claim 1 recites “wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.” Ex. 1001, 8:36–38 (“the ‘wherein’ limitation”). Petitioners state that Wu as modified by Chaffee satisfies this limitation. Pet. 59. According to Petitioners, “air flows through gate member 200 of Wu during inflation, and, when combined with Chaffee’s teachings, this occurs within the interior region of the housing containing the pump components of Wu’s system 10.” *Id.* (citing Ex. 1002 ¶¶ 231–233; Ex. 1005, 5:56–6:4, Fig. 1). Petitioners also state that “air flows through gate member 200 of Wu during deflation, and, when combined with Chaffee’s teachings, this occurs within the interior region of the housing.” *Id.* at 59–60 (citing Ex. 1002 ¶¶ 234–235; Ex. 1005, 6:8–16, Fig. 1).

The record evidence, summarized above, supports Petitioners’ position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu as modified by Chaffee discloses the subject matter of the “wherein” limitation. Patent Owner does not dispute that Wu as modified by Chaffee discloses the subject matter of this limitation.

(7) The Asserted Reasons to Modify Wu with Chaffee

Petitioners argue that a person of ordinary skill in the art at the time of the invention “would have been motivated by the[relied-upon] teachings of

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Chaffee . . . to incorporate blower 15 and rotary valve 100 of Wu into a housing and build that housing into Wu’s inflatable body.” Pet. 41 (citing Ex. 1002 ¶ 188). As to the “interior region” limitation, Petitioners assert that one of ordinary skill in the art at the time of the invention “would have been motivated to dispose Wu’s pump components—*i.e.*, rotary valve 100 and motorized blower 15—inside a housing (as taught by Chaffee)” because:

(1) “a POSA would have understood that using a housing like Chaffee’s would have provided better **spatial efficiency**” (*id.* at 42–43 (citing Ex. 1002 ¶ 193; Ex. 1006, 4:18–19)); (2) “a POSA would have been motivated to dispose Wu’s pump components within a housing because doing so would have provided better **durability**” (*id.* at 43 (citing Ex. 1002 ¶ 194)); (3) “a POSA would have recognized that containing Wu’s pump components in a housing would have decreased manufacturing and logistics **costs**” (*id.* (citing Ex. 1002 ¶ 195)); (4) “Wu is silent regarding how its pump components (such as rotary valve 100 and blower 15) structurally interface with one another and with Wu’s air mattress 400” and thus, “to create a structurally sound design, a POSA would have looked to known options for providing that missing information, and containing these components in a compact housing like Chaffee’s would have been one of a limited number of options, especially given the well-known desire for spatial efficiency” (*id.* at 44 (citing Ex. 1002 ¶ 196)); and (5) “a POSA would have appreciated that containing Wu’s pump components in a housing like Chaffee’s was a well-known option from prior art pump designs that yielded nothing more than predictable results—a Uni-directional Pump Assembly contained in a housing” (*id.* at 44–45 (citing Ex. 1002 ¶ 197)).

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As to the “built into” limitation, Petitioners assert that a person of ordinary skill in the art at the time of the invention “would have been motivated to contain Wu’s pump components (e.g., blower 15 and rotary valve 100), in a housing (e.g., as taught by Chaffee’s Housing), such that the housing was built into Wu’s inflatable body (e.g., air mattress 400)” (Pet. 48 (citing Ex. 1002 ¶ 203)) because: (1) “a POSA already had a reason to combine the pump components of Wu’s system 10 with a housing” for the reasons discussed in the prior paragraph (Pet. 48 (citing Ex. 1002 ¶ 204)); (2) “a POSA would have recognized the built in design to be more **time- and labor-efficient**, as it enhanced user convenience” (*id.* at 48–49 (citing Ex. 1002 ¶ 205)); (3) “not only would placing Wu’s pump components inside a housing have led to better **spatial efficiency**, increased **durability**, and improved **costs** and marketability for the reasons” discussed in the prior paragraph, “but these same key design factors would have been enhanced by then building that housing in the inflatable body” (*id.* at 49–50 (citing Ex. 1002 ¶¶ 206–209)); (4) “because Wu is silent about how its pump components structurally interfaced with air mattress 400, a POSA would have been motivated to look to the prior art to provide that teaching” and “[t]he built-in Housing design of Chaffee would have provided one such known interface design, and implementing it with the pump components of Wu’s system 10 would have been well within a POSA’s technical grasp” (*id.* at 50 (citing Ex. 1002 ¶¶ 210–211)); and (5) “a POSA would have recognized this design modification to be nothing more than an obvious combination of familiar elements using known methods to achieve a predictable result” (*id.* (citing Ex. 1002 ¶ 212)). Patent Owner argues that

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one of ordinary skill in the art would not have been motivated to modify Wu based on Chaffee. PO Resp. 23–25, 36–47; PO Surreply 11–14.

First, Patent Owner challenges at least some of the reasoning provided by Petitioners (and summarized in the prior two paragraphs) as to why one of ordinary skill in the art at the time of the invention would have allegedly modified Wu based on Chaffee. PO Resp. 42–47; PO Surreply 11–14.

Spatial Efficiency

As discussed above, Petitioners assert that one of ordinary skill in the art would have viewed *both* aspects of the proposed modification—i.e., disposing Wu’s rotary valve 100 and blower 15²² inside a housing and building that housing into Wu’s mattress 400—as providing improved “spatial efficiency.” *See, e.g.*, Pet. 42–43 (citing Ex. 1002 ¶ 193; Ex. 1006, 4:18–19; Pet. 8–21), 48–49 (citing Ex. 1002 ¶¶ 204, 206–207; Ex. 1006, 4:50–59; Ex. 1013, 2:40–52; Pet. 8–21). Patent Owner argues that one of skill in the art would *not* have modified Wu as proposed for spatial efficiency reasons because “there would be no advantage to doing so.” PO Resp. 42.

The record here supports Petitioners’ assertion that one of skill in the art would have been motivated by the improved spatial efficiency of the proposed modification in that Wu’s pump components, once housed in the wall of the mattress 400, would have had a more compact *overall* design and thus a reduced opportunity to “‘impact or interfere with the use of’ air mattress 400.” Pet. 49 (quoting Ex. 1006, 4:50–56 (“In one embodiment, the exterior profile (total volume and shape) of the fluid controller and inflated

²² Like Petitioners (*see, e.g.*, Pet Reply 9), we will refer to these elements, collectively, as “Wu’s pump components.”

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device in combination are essentially the same as the exterior profile of the inflated device absent the combination, thus reducing the opportunity for fluid controller 80 to impact or interfere with the use of inflatable device 10.”) (citing Pet. 8–21 (discussing the “State of the Art”)); *see also* Pet. 17 (discussing how “prior art inventors began designing more compact, space-efficient pumps by containing the pump components in an enclosure or housing” (citing Ex. 1002 ¶¶ 92–93; Ex. 1010, Figs. 20–31; Ex. 1030, Figs. 3B, 7; Ex. 1031, Figs. 1–7, 11; Ex. 1045, Figs. 1, 4–6; Ex. 1037, Figs. 8–9)).

In addition, Petitioners contend that the more compact overall design of the modified device would have generated an additional benefit in that “air mattress 400 would have, for example, ‘fit into a standard sized bed frame.’” Pet. 49 (quoting Ex. 1006, 4:56–59) (citing Ex. 1002 ¶ 207; Ex. 1013, 2:40–52). Petitioners support this reasoning with the testimony of Dr. Beaman. *See, e.g.*, Ex. 1002 ¶ 193 (discussing how “spatial efficiency . . . is one of the five key design factors [one of ordinary skill in the art] would have considered” (emphasis omitted)), ¶¶ 206–207.

Patent Owner asserts that Petitioners’ position is set forth “in conclusory fashion without any supporting facts.” PO Resp. 42 (citing Pet. 43). Although Petitioners do not provide specific calculations as to the amount of spatial efficiency achieved with the proposed modification, based on the record evidence discussed in the prior three paragraphs, we are persuaded by Petitioners’ argument that incorporating Wu’s pump components from *outside* mattress 400 to *within* mattress 400, based on the teachings of Chaffee, would result in a “more compact, spatially efficient” overall design. Pet. 43; *compare* Ex. 1005, Fig. 1, *with* Ex. 1006, Figs. 2, 5.

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Next, Patent Owner argues that the modified device would actually be “spatially inefficient” because the allegedly necessary control network “would occupy a substantial area within any singular enclosure.” PO Resp. 42 (citing Ex. 2029 ¶ 109). On this issue, we credit Petitioners’ evidence and the testimony of Dr. Beaman as to the “compact” nature of Wu’s own control network, but also as to “the small and compact nature of comparable ‘control networks.’” Pet. Reply 15 (citing Ex. 1625 ¶¶ 80–84; Ex. 1005, 1:27–30; Ex. 1635, 438:4–21; Ex. 1032, 2:34–36, 3:19–4:61, Figs. 1, 2, 4; Ex. 1633, Fig. 2, 3:23–44); Ex. 1005, 1:31–34 (Wu describing its “simple, compact air mattress air supply *and control system*” (emphasis added)). In contrast, the relied-upon testimony of Dr. Stevick merely repeats Patent Owner’s argument (nearly word-for-word) with no additional analysis, facts, or data. *Compare* Ex. 2029 ¶ 109, *with* PO Resp. 42. Such testimony is entitled to little or no probative weight. *See* 37 C.F.R. § 42.65(a).

Patent Owner further argues that “the weight of the blower 15, rotary valve 100, and all of the attendant control hardware would create a housing that was so large as to be impractical to integrate into the wall of an inflatable device, and therefore no spatial efficiency would be achieved.” PO Resp. 43 (citing Ex. 2029 ¶ 111). This argument, however, is not supported by the record. *See* Pet. Reply 15 (arguing that Patent Owner’s contention is “pure conjecture” (citing *In re Gorelik*, 652 F. App’x 954, 958 (Fed. Cir. 2016) (nonprecedential))). Again, the relied-upon testimony of Dr. Stevick essentially repeats Patent Owner’s argument with no additional analysis, facts, or data. *Compare* Ex. 2029 ¶ 111, *with* PO Resp. 43; 37 C.F.R. § 42.65(a).

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Patent Owner also argues that the modified device would “require additional cooling hardware thereby making for an even more spatially inefficient design.” PO Resp. 42–43 (citing Ex. 2029 ¶ 110). As discussed further below (*see infra* pp. 64–66), the record does not support the argument that the modified device would have overheated or required the addition of “cooling hardware.” The relied-upon testimony of Dr. Stevick again essentially repeats the argument with no additional analysis, facts, or data. *Compare* Ex. 2029 ¶ 110, *with* PO Resp. 42–43; 37 C.F.R. § 42.65(a).

Durability

As discussed above, Petitioners also assert that one of ordinary skill in the art would have viewed both aspects of the proposed modification—disposing Wu’s pump components inside a housing and building that housing into Wu’s mattress 400—as providing improved “durability.” *See, e.g.*, Pet. 43 (citing Ex. 1002 ¶ 194; Ex. 1006, 4:20; Pet. 8–21), 48–50 (citing Ex. 1002 ¶¶ 204, 206, 208; Ex. 1023, Fig. 1, 1:9–14, 2:123–132, 3:18–22; Ex. 1054, 1:29–31; Pet. 8–21). Patent Owner argues that the proposed modification of Wu based on Chaffee would *not* improve durability. PO Resp. 43–44; PO Surreply 11–12.

The record here supports Petitioners’ argument that one of skill in the art would have been motivated by the increased durability of the proposed modification, in that Wu’s pump components, once housed in the wall of the mattress 400, would have been better protected “‘from accident, injury, or separation’ from the mattress.” Pet. 49–50 (quoting Ex. 1023, 2:123–132) (citing Ex. 1002 ¶ 208; Ex. 1023, Fig. 1, 1:9–14, 2:123–132, 3:18–22; Ex. 1054, 1:29–31 (describing built-in air pumps as being “resistant to chemical and physical attack, especially to moisture and oxidation”)); Pet. 8–

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21 (discussing the “State of the Art”)); *see also* Pet. 19 (discussing how “prior art inventors recognized that a pump built into the inflatable body better protected the pumps and, therefore, resulted in more durable products” (citing Ex. 1002 ¶¶ 104–105; Ex. 1023, Fig. 1, 1:9–14, 2:123–132, 3:18–22; Ex. 1054, 1:29–31)). Indeed, as noted by Petitioners, Chaffee itself teaches that a housing serves “to protect the inner workings of the pump.” Ex. 1006, 4:20, *quoted at* Pet. 43 (also stating that a built-in design would have protected Wu’s pump components “from damage or other harm—thus making it a more durable, longer-lasting structure”). This reasoning is supported by the testimony of Dr. Beaman. *See* Ex. 1002 ¶ 194 (discussing how “better durability . . . is one of the five key design factors [one of ordinary skill in the art] would have considered” (emphasis omitted)), ¶ 208 (discussing how a built-in design “would have improved durability during manufacturing, as the housing would have protected the components during assembly”).

Patent Owner counters that Petitioners “offer no supporting facts” on this issue. PO Resp. 43 (citing Pet. 43). Although Petitioners do not provide specific calculations as to the amount of increased durability achieved with the proposed modification, based on the record evidence discussed in the prior two paragraphs, Petitioners argue persuasively that incorporating Wu’s pump components from *outside* mattress 400 to *within* mattress 400, as proposed (based on the teachings of Chaffee), would result in a more durable overall design. Pet 43, 49–50; *compare* Ex. 1005, Fig. 1, *with* Ex. 1006, Figs. 2, 5; *see also* Ex. 1636, 663:1–4 (“Q. So if a pump is placed within a mattress, do you agree that that mattress will provide a level of protection for the pump? A. It can.”).

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Patent Owner further argues that one of skill in the art would have understood “that built in designs can add stress to the material of the inflatable product” such that “[a] housing with the components of system 10 would be relatively heavy and likely to damage the walls of an inflatable device.” PO Resp. 44. Specifically, Patent Owner contends that “[a]ny movement of the air mattress with such components built in would jeopardize the integrity of the wall material and create a risk of punctures.” *Id.* (citing Ex. 2029 ¶ 113). The record does not support this contention. *See* Pet. Reply 15 (arguing that aspects of this argument are “pure conjecture” (citing *Gorelik*, 652 F. App’x at 958)). For example, the relied-upon testimony of Dr. Stevick essentially repeats Patent Owner’s argument with no additional analysis, facts, or data. *Compare* Ex. 2029 ¶ 113, *with* PO Resp. 44. Such testimony is entitled to little or no probative weight. *See* 37 C.F.R. § 42.65(a).

In the context of this argument, Patent Owner also contends that Dr. Beaman “admitted that attempting to build a pump into the air mattress could cause the patient to hit the pump and cause the pump to land hard on the surface under the air mattress, *which is not a durable design . . . and is avoided by*” not performing the proposed modification. PO Resp. 44 (emphasis added) (citing Ex. 2040, 836:1–838:13, 841:17–842:14); *see also* PO Surreply 11 (“Durability is a result of many different factors, and Dr. Beaman, provides additional considerations, which Petitioner[s] do[] not address.” (citing PO Resp. 44)). Although Dr. Beaman does, in the cited deposition testimony, discuss how certain uses of the modified device may result in impact or damage, we are more persuaded by Petitioners’ argument that Patent Owner has mischaracterized Dr. Beaman’s testimony. Pet. Reply

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13 (stating that, with this discussion, Patent Owner “mischaracterizes” Dr. Beaman’s deposition testimony); *see* Ex. 2040, 838:14–839:20 and 841:17–842:1 (discussing how the pump could be located to minimize impacts); Ex. 1625 ¶ 72 (discussing PO Resp. 44).

Patent Owner also contends that “[b]uilt-in designs can also add heat to the material, resulting in faster aging and potential breakdown of the material” and that one of skill in the art would have understood “that placing all of Wu’s control system components together in one housing within the walls of an inflatable device would only exacerbate such [overheating] issues, making the design less durable and more impractical.” PO Resp. 44 (citing Ex. 2029 ¶ 114). As discussed further below (*see infra* pp. 64–66), the record does not support the argument that the modified device would have overheated.

Additional Asserted Reasons to Modify Wu with Chaffee

We have reviewed Petitioners’ additional asserted reasons to modify Wu based on Chaffee (which are argued in the alternative), and we determine that those reasons are not as strongly supported by the record as the two reasons discussed above (spatial efficiency and durability). *See, e.g.*, Pet. 43 (discussing “a POSA would have recognized that containing Wu’s pump components in a housing would have decreased manufacturing and logistics costs”), 44 (discussing how, “to create a structurally sound design, a POSA would have looked to known options for providing that missing information, and containing these components in a compact housing like Chaffee’s would have been one of a limited number of options”), 44–45 (discussing how “a POSA would have appreciated that containing Wu’s pump components in a housing like Chaffee’s was a well-known option

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from prior art pump designs that yielded nothing more than predictable results—a Uni-directional Pump Assembly contained in a housing”), 48–49 (discussing how “a POSA would have recognized the built in design to be more **time- and labor-efficient**, as it enhanced user convenience”), 49–50 (discussing how “not only would placing Wu’s pump components inside a housing have led to . . . improved **costs** and marketability,” “but th[is] same key design factor[] would have been enhanced by then building that housing in the inflatable body”) 50 (discussing how “because Wu is silent about how its pump components structurally interfaced with air mattress 400, a POSA would have been motivated to look to the prior art to provide that teaching” and “[t]he built-in Housing design of Chaffee would have provided one such known interface design, and implementing it with the pump components of Wu’s system 10 would have been well within a POSA’s technical grasp”), 50 (discussing how “a POSA would have recognized this design modification to be nothing more than an obvious combination of familiar elements using known methods to achieve a predictable result”).

Patent Owner’s Additional Arguments

In addition to the arguments discussed above addressing the alleged improved spatial efficiency and durability of the proposed modification, Patent Owner provides other arguments as to why one of ordinary skill in the art would not have modified Wu based on Chaffee.

First, Patent Owner argues that “Petitioners’ analysis [i]mproperly [i]gnores the [c]ontrols and [p]urposes of Wu’s [s]ystem 10.” PO Resp. 38. Patent Owner argues that “Petitioners[’] references to Wu really only refer to

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a subset of the disclosed system.” *Id.* (citing Pet. 31). Patent Owner notes that the annotated version of Figure 1 of Wu provided by Petitioners “placed red labels *only* on the rotary valve 100, blower 15 and air mattress 400” despite that, according to Patent Owner, “control system 10 also includes: filter 30, air mattress supply lines 302A–D and 302S, a continuous exhaust line 304, stepper motor controlled valves 310A–D, lines 52 and 54, pressure sensors 312A–D, a control unit 50, control line 53, and control panel 70.” *Id.* at 38–39 (citing Pet. 32; Ex. 1005, 2:44–4:49). Patent Owner argues (1) that one of ordinary skill in the art would have “underst[oo]d that the control components are an important part of the operation of system 10” and (2) that “[w]ithout a control network, the motor of blower 15 has no input signal 53 and the stated purpose of the Wu invention to provide ‘an air mattress air supply and control system’ is defeated.” *Id.* at 40, 41 (citing Ex. 1005, 1:31–55). Patent Owner asserts that “[i]f a proposed combination would defeat the purpose of a reference, that reference ‘teaches away from the claimed design.’” *Id.* at 41 (quoting *In re Haruna*, 249 F.3d 1327, 1336 (Fed. Cir. 2001)). Patent Owner states, “[t]he Board has dismissed petitions that do not adequately address the critical components of a primary reference and their stated purpose when the proffered combination defeats the purpose of the invention.” *Id.* at 41–42 (citing *One World Techs., Inc. v. The Chamberlain Grp., Inc.*, IPR2016-01846, Paper 8 at 14 (PTAB Mar. 24, 2017)). Patent Owner argues that one of ordinary skill in the art would have “appreciate[d] that high air pressure blowers, like the one in Wu, would be more likely to rupture a mattress, and would be unsuitable for their intended purpose without a control system.” PO Resp. 37–38 (citing Ex. 2029 ¶ 99 later in the discussion). Along this vein, Patent Owner also argues that a

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“combination with the control system of Wu is much different than one without it” and that “Petitioners should have to set forth their ground with particularity.” *Id.* at 38 (citing 35 U.S.C. § 312).

Patent Owner’s arguments do not demonstrate a deficiency in Petitioners’ asserted ground; the fact that Petitioners did not address Wu’s control system does not indicate that Petitioners proposed *removing* the control system *already in Wu* (which is what Patent Owner argues would render the modified device unsuitable for the intended purpose of Wu). Instead, we are more persuaded by Petitioners’ explanation that it did not address Wu’s control system because claim 1 does not recite a control network (or similar requirement). *See* Pet. Reply 14–15 (stating that Petitioners did not ignore Wu’s ‘control network’ but did not address it because it is unclaimed” (citing Inst. Dec. 32; Ex. 1625 ¶¶ 77–78)). Here, Petitioners have not proposed the modification that Patent Owner alleges would defeat the purpose of Wu: *removing* the control network *already present* in Wu. Instead, the proposed modification concerns incorporating blower 15 and rotary valve 100 into a housing and building that housing into mattress 400 in Wu. *See* Pet. 38–51.

Second, Patent Owner asserts several reasons that one of ordinary skill in the art would allegedly “[a]ppreciate [t]hat Wu’s [m]otor [a]nd [b]lower [a]re [d]esigned to [b]e [s]eparate [f]rom [a]ny [a]ir [m]attress” and “should not be built into any ‘inflatable body’” (PO Resp. 23) such that one of ordinary skill in the art would not have performed the proposed modification (*id.* at 23–25, 46–47; PO Surreply 12–14). We address each reason in turn below.

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Patent Owner asserts that “[a] user would not want a blower built into a low air loss bed like Wu’s, since it would operate continuously to provide a constant stream of air and become a source of unwanted noise and vibration.” PO Resp. 23–24. The contention that the proposed modifications would *increase* noise and vibrations from that present in Wu is not supported by the record here. Instead, we are more persuaded by Petitioners’ argument that Patent Owner “cites no evidence to support these purported concerns.” Pet. Reply 12–13.

Patent Owner also asserts that one of ordinary skill in the art would have understood that the proposed modification “would be completely unnecessary, since Wu is not designed to be ‘conveniently carried,’ as the inflatable mattresses of the ’394 Patent are designed to be.” PO Resp. 24 (quoting Ex. 1001, 1:32–33). The fact that an unclaimed benefit highlighted in the ’394 patent may not be present in the context of the modified device, however, does not undermine the motivation statements provided by Petitioners. *See Alcon Res., Ltd. v. Apotex, Inc.*, 687 F.3d 1362, 1368 (Fed. Cir. 2012) (“We have repeatedly held that the motivation to modify a prior art reference to arrive at the claimed invention need not be the same motivation that the patentee had.”).

Patent Owner next argues that “[a] user would also not want a Wu blower built into a substantially airtight mattress, such as the Chaffee design, since blowers are designed to provide a high pressure air flow and use a large and costly control system” and that “Wu’s design of continuous ongoing operation is antithetical to building a pump into an airbed, which creates heat issues.” PO Resp. 24.

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As an initial matter, Patent Owner’s argument is premised on the presence of a “substantially airtight” mattress in the modified device. As discussed above (*see supra* § II.B.1), we do not construe “inflatable body” as including a “substantially airtight” requirement. Moreover, Patent Owner has not adequately explained, or identified adequate evidentiary support for, why incorporating Wu’s pump components into mattress 400 in Wu and maintaining Wu’s continuous operation would result in overheating.

Specifically, we are not persuaded by Dr. Stevick’s unsupported testimony that incorporating Wu’s pump components into a housing “would result in substantially less air cooling of the motor than is afforded by the separate blower approach of Wu” and stated, without qualification, that one of ordinary skill in the art “would avoid designs where the air cooling would be a worse problem than the previous design.” Ex. 2029 ¶ 71. Even assuming that the proposed modification would result in decreased cooling, this testimony further presumes (without evidence) that the original Wu design is at its minimum necessary air cooling level. Instead, we are more persuaded by Petitioner’s argument (Pet. Reply 11) that this testimony conflicts with Dr. Stevick’s deposition testimony that (as characterized by Patent Owner) one of ordinary skill in the art “would be aware of heat and take it into account” (PO Surreply 12 (citing Ex. 1602, 460:4–10)).

On this issue, Dr. Stevick and Patent Owner also cite the following statement from the Background of the Invention section of Wu for support: “Another object of the present invention is to provide an air mattress air supply and control system having a fan and motor that will not over heat as is now the case with many existing systems.” Ex. 1005, 1:35–38, *cited at* PO Resp. 24 & Ex. 2029 ¶ 71. As noted by Petitioners and discussed by

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Dr. Beaman, however, this statement was not addressing a “built-in pump” (as in the modified device) at all. *See* Pet. Reply 11 (citing Ex. 1625 ¶¶ 59–61); Ex. 1625 ¶ 61 (“Wu is not describing an overheating issue with ***built-in*** pump housing designs but, rather, designs of continuously operating air supply systems for low air loss inflatable mattresses.” (citing Ex. 1005, 1:27–54)). Rather, as further noted by Petitioners and Dr. Beaman, Wu was discussing *prior art* continuously running pumps. *See* Pet. Reply 11 (citing Ex. 1625 ¶¶ 59–61); Ex. 1625 ¶ 61 (“Moreover, Wu referenced this problem with respect to ***prior art*** designs but noted that the Wu disclosure adequately addressed this issue.” (citing Ex. 1005, 1:36–39)).

Patent Owner’s statement above also cites to the deposition testimony of Dr. Beaman. *See* PO Resp. 24 (citing Ex. 2040, 152:16–155:1). This testimony relates to unidentified “air bed[s] with . . . built-in pump[s]” and addresses statements in the manuals of those unidentified beds that their pumps should not be run indefinitely due to possible overheating. *See* Ex. 2040, 152:16–155:1. That testimony however, does not support the presence of overheating *in the modified device*. As discussed above, the identified “inflatable body”—Wu’s mattress 400—is *not* substantially airtight and the modified system is *intended* to run continuously. *See* Tr. 56:7–17 (counsel for Patent Owner discussing how mattress 400 in Wu “remains inflated as long as you’re continuously pumping air into it, as soon as you stop it deflates”), 59:18–19 (counsel for Patent Owner discussing how mattress 400 in Wu “is an airflow bed [that is] not substantially airtight” and “is designed for continuous operation”). In contrast, Patent Owner’s argument relies on the potential for overheating in air beds that *do not* permit air to circulate (as Wu’s mattress 400 does) and are *not* designed

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to run continuously (as Wu’s system is). *See* Tr. 61:11–62:9 (discussing “Intex’s own built-in pump model” at Ex. 2635); Ex. 2635, 1 (instructing to “[l]et pump cool at least 10 minutes *between uses*” (emphasis added) and to “[u]nplug electrical power cord when not in use”); Tr. 124:13–126:7 (discussing differences between the product in Ex. 2635 and Wu).

In addition, Dr. Beaman testifies that “even if overheating were an issue in a continuously operating pump, it would not be a deterrent” because of “the creative inferences and steps that a POSA would have employed to address this issue, in view of the many known benefits of a built-in design.” Ex. 1625 ¶ 64, *cited at* Pet. Reply 12; *see also* Ex. 2040, 844:1–6 (discussing how “you can design” for “heat that’s going to build up around the motor” in an internal configuration), 845:4–9 (discussing how “you could cool [an internal motor configuration] with airflow”). Moreover, to the extent Patent Owner contends that *all* built-in pumps have overheating issues, that draws into question how the applicant in the ’394 patent overcame such a common problem when this issue is not discussed in the ’394 patent. *See Smith & Nephew, Inc. v. Rea*, 721 F.3d 1371, 1381–82 (Fed. Cir. 2013) (addressing a patent owner’s argument as to an alleged technical issue in the proposed combination, stating that “[t]his naturally raises the question of how [patent owner] managed to make such a combination work”), *cited at* Pet. Reply 12. For the reasons above, the record shows that one of skill in the art (1) would have considered cooling of the motor as *one of several factors* in the design and (2) would have understood that a “built-in pump” design may have had somewhat less cooling than an external pump design, but also (3) would have been able to address any increased heating without undermining the benefits of a built-in pump.

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Next, Patent Owner states that “Wu allows for CPR of a patient by rapidly deflating a mattress to allow for the patient to rest on a hard surface to enhance chest compressions.” PO Resp. 24. According to Patent Owner, “[i]f even one of a flange, housing, motor, valve were disposed even partially in Wu’s airbed these objects would protrude as the mattress is deflated, and a patient could be exposed to them.” *Id.* at 25. Patent Owner states: “Worse yet, these objects could impede with that safe and effective delivery of CPR to the patient” such that one of ordinary skill in the art “would avoid placing any motor or valve in a medical airbed such as Wu’s because such a design fails to provide a safe configuration for applying CPR.” *Id.*

Patent Owner does not cite any evidence for these assertions. *See* PO Resp. 24–25; *see* Pet. Reply 13 (stating that Patent Owner “cites no evidence to support th[is] purported concern[]”). And although Dr. Stevick essentially restates this argument in his declaration (*see* Ex. 2029 ¶¶ 72–73), we do not find that testimony, which cites no additional analysis, facts, or data, either helpful or persuasive. *See* 37 C.F.R. § 42.65(a).

Instead, we find more credible the testimony of Dr. Beaman, who states: “With respect to Wu’s CPR functionality, [one of ordinary skill in the art] would have recognized that the pump could have simply been built into the foot of the mattress so as not to impact any chest compressions being performed on the patient.” Ex. 1625 ¶ 72, *cited at* Pet. Reply 13.

Addressing this issue in the Surreply, Patent Owner asserts that Dr. Beaman “admitted” that one of ordinary skill in the art “would know that embedding a pump anywhere in a Wu-style medical airbed creates unnecessary risks for patients in the midst of medical emergencies that can be avoided by keeping

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the pump external and ***not*** building it in.” PO Surreply 13 (citing Ex. 2753, 193:11–194:19). We disagree. We understand Dr. Beaman’s testimony as acknowledging that “[y]ou certainly wouldn’t hit the pump if it was outside the bed” (Ex. 2753, 194:17–19), but he also stated that the pump could be located so as “not to impact any chest compressions” (*id.* at 194:8–12). *See Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000) (“The fact that the motivating benefit comes at the expense of another benefit, however, should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another.”).

Patent Owner argues more generally that

Dr. Beaman admitted there are ***many*** motivations ***to decide against*** modifying Wu to putting the pump in a housing in the mattress, including increased heat problems, logistical problems of running various lines from an internal pump to all the chambers that would not hold the pump, possible user injury, greater potential damage to the pump, greater potential for fluids to enter and ruin the pump, possible electrocution during CPR that Wu is designed to handle.

PO Resp. 25 (citing Ex. 2040, 830–851). According to Patent Owner, “[n]o reasonable [person of ordinary skill in the art] would review Wu and think it would be a good idea to take the external pump and control system, put them in a housing, and put the housing into the air mattress.” *Id.*

Although the cited testimony by Dr. Beaman does identify design considerations with the proposed modified device, we do not agree with Patent Owner that Dr. Beaman “admitted” that these considerations show sufficiently that one of ordinary skill in the art *would not have been* motivated to perform the modification proposed. *See* Pet. Reply 11 n.3 (citing Ex. 1625 ¶¶ 66, 86–87); *see also* Ex. 2040, 839:7–13 (“Q. The other

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possibility is you could decide not to put [a pump] in the bed and then you wouldn't have to worry about it hitting the hard surface when you needed to do a CPR rapid deflation; right? A. Then there's considerable disadvantages with that."). Indeed, even if the proposed modification has *some* disadvantages, that "does not necessarily obviate motivation to combine." *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006).

For the reasons above, we determine, in light of the complete record, that Petitioners have shown that one of ordinary skill in the art at the time of the invention would have been motivated to modify Wu based on Chaffee, as proposed, for at least the purposes of improved spatial efficiency and improved durability.

(8) Objective Evidence of Nonobviousness

We turn next to Patent Owner's objective evidence of nonobviousness and Petitioners' rebuttal evidence. Objective evidence of nonobviousness, when present, must always be considered as part of an obviousness inquiry. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012). Notwithstanding what the teachings of the prior art would have suggested to one of ordinary skill in the art at the time of the patent's invention, the totality of the evidence submitted, including objective evidence of nonobviousness, may lead to a conclusion that one or more of the Challenged Claims would not have been obvious to one of ordinary skill in the art. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Objective evidence may include long-felt but unsolved need, failure of others, unexpected results, commercial success, copying, licensing, and praise. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18

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(1966); *Leapfrog Enters., Inc. v. Fisher–Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007).

“For objective evidence to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.” *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). A nexus must be demonstrated for all types of objective evidence of nonobviousness. *See id.* (addressing nexus generally); *Rambus Inc. v. Rea*, 731 F.3d 1248, 1256 (Fed. Cir. 2013) (addressing long-felt need); *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012) (addressing copying); *In re Kao*, 639 F.3d 1057, 1069 (Fed. Cir. 2011) (addressing unexpected results); *Muniauction, Inc. v. Thomson Corp.*, 532 F.3d 1318, 1328 (Fed. Cir. 2008) (addressing praise); *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996) (addressing commercial success). The stronger the showing of nexus, the greater the weight accorded the objective evidence of nonobviousness. *See GPAC Inc.*, 57 F.3d at 1580 (“To the extent that the patentee demonstrates the required nexus, his objective evidence of nonobviousness will be accorded more or less weight.”); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 306 (Fed. Cir. 1985). Conversely, the stronger the showing of nexus, the greater the weight accorded the objective evidence of nonobviousness.

“[T]here is a presumption of nexus for objective considerations when the patentee shows that the asserted objective evidence is tied to a specific product and that product ‘is the invention disclosed and claimed in the patent.’” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1329 (Fed. Cir. 2016) (internal citation omitted); *see also PPC Broadband, Inc. v. Corning Optical Commc’ns RF, LLC*, 815 F.3d 734, 747 (Fed. Cir. 2016) (“Because the

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evidence shows that the SignalTight connectors are ‘the invention disclosed and claimed in the patent,’ we presume that any commercial success of these products is due to the patented invention This is true even when the product has additional, unclaimed features.”) (internal citations omitted).

Patent Owner produces evidence directed to alleged commercial success, failure to use alternatives, broad acceptance, praise, licensing, long-felt need, and skepticism of others²³. PO Resp. 68–76. We address each of these indicia in turn, below, for all of the Challenged Claims. First, however, we address nexus generally.

Nexus

As we explain in greater detail below, based on the complete record, we determine that Patent Owner is entitled to a presumption of nexus with respect to certain Challenged Claims because Patent Owner has “show[n] that the asserted objective evidence is tied to . . . specific product[s] and [those] products ‘[are] the invention disclosed and claimed in the patent.’” See *WBIP, LLC*, 829 F.3d at 1329. This presumption is based solely on the stipulations of infringement by certain competitors, as Patent Owner has failed to provide persuasive evidence that serves as a basis for a nexus for its products or any other competitor products not covered by the stipulation.

Relying on the testimony of Dr. Stevick, Patent Owner asserts that its products “and competitor products practice the inventive aspects of the ‘394 [p]atent [c]laims.” PO Resp. 69–70 (citing Ex. 2029 ¶¶ 179–218 & Appx.). First, Patent Owner points out that certain competitors involved in the Texas Litigation admitted that their products infringed some of the Challenged

²³ Patent Owner characterizes this indicium of nonobviousness as “against conventional wisdom.” PO Resp. 75.

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Claims. *See* PO Resp. 70; Ex. 2025, 2–4. Specifically, Patent Owner contends that “Intex and Bestway, the largest makers of airbeds sold in the U.S., admitted their products infringe the ‘394 [p]atent [c]laims.” PO Resp. 70 (referencing Ex. 2025). Second, Patent Owner argues that “Dr. Stevick analyzed the industry and found that in the market electric ‘built-in-pump’ airbeds with power inflation and deflation generally refer to products that practice the ‘394 [p]atent [c]laims.” *Id.* (citing Ex. 2029 ¶¶ 219–230). Patent Owner adds that “Dr. Stevick showed that the design showing secondary considerations specifically aligns with the claims of the ‘394 patent.” *Id.* Third, Patent Owner relies on Dr. Stevick’s testimony that its own products practice the Challenged Claims. PO Resp. 69–70; *see* Ex. 2029 ¶¶ 179–215 (containing analysis of Patent Owner’s products against the Challenged Claims).

Petitioners counter that Patent Owner is not entitled to a presumption of nexus in this case. Pet. Reply 22. Petitioners argue that Patent Owner’s declarant failed to fully analyze any of Patent Owner’s products against the Challenged Claims. *Id.* Petitioners add that they dispute infringement as to several of the Challenged Claims. *Id.* at 22–23. Petitioners also argue that Patent Owner’s nexus position relies on equating use of the phrase “built-in pump” in marketing material with falling within the scope of the Challenged Claims. *Id.* at 23.

As to the admission of infringement by certain competitors in the Texas Litigation, products from Airtek, Air Cloud, Air Comfort, AirBedz, Altimair, Pittman, and TexSport admittedly infringe claims 1–5, 7–12, 16–20, 22, and 23 (i.e., most, but not all, of the Challenged Claims) of the ‘394 patent. Ex. 2025, 2. Products from Intex, Bestway, and Boyd admittedly

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infringe claims 1–5, 7, 8, 10, and 12 of the '394 patent. *Id.* Because certain of Patent Owner's objective evidence of nonobviousness is directed to these products, Patent Owner's evidence in this regard demonstrates at least some showing of nexus.

We agree with Petitioners' position that Dr. Stevick's testimony fails to provide sufficient support that Patent Owner's products practice any of the Challenged Claims. Pet. Reply 22. Specifically, we are not persuaded by the testimony of Dr. Stevick that:

I have personally reviewed the pumps incorporated in [Patent Owner's] airbed models including the following built-in pumps: EZ V AC Dual Pump and EZ V Auto Shut Off Pump (collectively, "TWW Pumps").

I have determined that each of the TWW Pumps practice at least claims 1, 2, 3, 7, 8, 9, 10, 12, 16, 17, 18, 22, and 23 of the '394 [p]atent [c]laims and claims 4, 5, 6, 19, 20 and 21 to the extent that the PTAB adopts the claim construction of "pipe" asserted by Petitioners.

Ex. 2029 ¶ 179. Petitioners argue convincingly that Dr. Stevick fails to provide support for this opinion covering both of the "TWW Pumps."²⁴ Pet. Reply 22. Based on our review of the complete record, including Dr. Stevick's testimony, we find that Dr. Stevick did not provide support that even one of Patent Owner's products practices any of the Challenged Claims. Dr. Stevick's analysis purports to compare Patent Owner's Insta-bed product number 840018, which uses the EZ V AC Dual Pump, with the Challenged Claims. Ex. 2029 ¶ 180. Our review of this testimony indicates

²⁴ Our review of the complete record did not provide us with any additional evidence to support this testimony, such as evidence in the record that packaging is marked with the '394 patent number or appropriate virtual marking. *See* 35 U.S.C. § 287(a).

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that Dr. Stevick compared different claim limitations of claim 1 against different pumps. *Compare* Ex. 2029 ¶ 180 (including testimony about EZ V AC Dual pump) *with* ¶¶ 181, 183 (including testimony about EZ V Auto-Shutoff pump) *and with* ¶¶ 182, 184–187 (providing testimony about “each” of the two pumps, relying on what was “shown above,” which was an image of the EZ V Auto-Shutoff pump only). Dr. Stevick does not provide any testimony about the similarities and differences of these two pump models or why his analysis equally applies to both pumps and the Insta-bed product number 840018.

In the remainder of his testimony on how Patent Owner’s products allegedly practice the Challenged Claims, Dr. Stevick addresses the limitations of a challenged dependent claim and declares “[e]ach of the TWW Pump models satisfy” the limitation of the claim without providing any additional information demonstrating how either of the two pumps satisfy the limitation or relies on analysis of previous claims. *See* Ex. 2029 ¶¶ 188–208.

In summary, although Dr. Stevick did provide *an* analysis of each Challenged Claim with respect to certain TWW Pumps, we agree with Petitioners that he did not fully analyze any of Patent Owner’s products. *See* Reply 22. Accordingly, Patent Owner has not demonstrated that it is entitled to a presumption of nexus based on its own products practicing the Challenged Claims.

We also agree with Petitioners that Patent Owner is not entitled to a presumption of nexus based on alleged infringement that was disputed or based solely on a product having a “built-in pump.” Pet. Reply 22–23; *see* PO. Resp. 69–70. Dr. Stevick testifies that he “personally reviewed airbed

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models that account for at least the substantial majority of airbeds with electric built-in pumps (‘BIP’) in the marketplace, and they follow the design of [Patent Owner’s] ‘394 [p]atent [c]laims.” Ex. 2029 ¶ 216.

Dr. Stevick’s testimony about the airbeds he “personally reviewed” is entitled to little weight, as he does not provide any of the underlying analyses for his opinion (such as his analyses from the Texas Litigation), including which airbed models he reviewed or how the airbeds practiced any of the Challenged Claims of the ’394 patent. *See* Ex. 2029 ¶¶ 216–218; 37 C.F.R. § 42.65(a).

Dr. Stevick testifies that “[m]anufacturers and retailers note the importance of a built-in electric pump that inflates and deflates in accordance with the ‘394 patent in their advertising.” Ex. 2029 ¶ 219. To support this opinion, Dr. Stevick references deposition testimony from corporate representatives from Bestway (USA) and Walmart. *Id.* Again, Dr. Stevick’s testimony is not persuasive. We have reviewed the referenced deposition testimony and find that it does not include any statements tying advertising to inflation and deflation as recited in the Challenged Claims. Similarly, as Petitioners argue, Patent Owner does not provide persuasive evidence that supports the contention that any reference to an electric “built-in pump” that inflates and deflates indicates that the inflatable product practices one or more of the Challenged Claims. *See* Pet. Reply 23; Ex. 2029 ¶¶ 219–220.

In summary, based on the complete record, we determine that Patent Owner is entitled to a presumption of nexus with respect to certain Challenged Claims. This presumption is based solely on the stipulations of infringement by certain competitors in the Texas Litigation, as Patent Owner

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has failed to provide persuasive evidence that serves as a basis for a nexus for its products or any other competitor products not covered by the stipulation. *See* Ex. 2025, 2–4.

We address Patent Owner’s arguments and evidence and Petitioners’ rebuttal arguments and evidence as to each specific indicium of nonobviousness, below.²⁵

Commercial Success

Having determined that there is at least some nexus, we consider Patent Owner’s arguments regarding the commercial success of the patented products. Patent Owner contends that “[s]ales of [REDACTED] of dollars of patented products proves ‘overwhelming’ commercial success.” PO Resp. 70 (citing an unpublished decision from the U.S. District Court for the Northern District of Texas). Patent Owner continues that “sales of the

²⁵ Patent Owner argues that “[t]he party asserting invalidity must overcome the presumption [of nexus] by *clearly and convincingly* proving secondary considerations are unrelated to the patented technology.” PO Resp. 69 (citing *WBIP, LLC*, 829 F.3d at 1329) (emphasis added). Patent Owner’s reliance on *WBIP* for this proposition is misplaced as that case involved district court litigation, where invalidity must be proved by clear and convincing evidence. *WBIP, LLC*, 829 F.3d at 1324; *see, e.g., Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1364 (Fed. Cir. 2018) (“A patent is presumed valid, and the burden of establishing invalidity of a claim rests on the party asserting invalidity by clear and convincing evidence.”). In an *inter partes* review proceeding, however, a petitioner must demonstrate, *by a preponderance of the evidence*, that a challenged claim is *unpatentable*. 35 U.S.C. § 316(e). Patent Owner provides no argument to support its proposition that Petitioners must overcome a presumption of nexus by clear and convincing evidence given the lower burden of proof for unpatentability in an *inter partes* review proceeding as compared to invalidity in a district court.

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patented products by Walmart alone have exceeded [REDACTED].” *Id.* (citing Ex. 2638 ¶¶ 15, 42; Ex. 2029 ¶¶ 226, 227, 237) (emphasis omitted). Patent Owner contends that “[t]he market for infringing airbeds is a significant portion of the overall airbed market and constitutes most airbed sales by revenue” and that “[t]he industry continues to grow, showing commercial success.” *Id.* (citing Ex. 2638 ¶¶ 44–48). Patent Owner argues that “[t]hese airbeds are sold due to the ‘394 patented design.” *Id.* at 71 (citing Ex. 2029 ¶¶ 175–255; Ex. 2638 ¶¶ 44–48).

Patent Owner also contends that “Petitioners and Real-Party-in-Interest Coleman’s own internal research shows” that inflation and deflation times are important to consumers. PO Resp. 71 (citing Ex. 2638 ¶¶ 53–58; Ex. 2029 ¶¶ 274–292).²⁶ This research includes online interviews with individuals who have purchased airbeds within 12 months of the survey. *See, e.g.*, Ex. 2697, 2; Ex. 2698, 2, *cited in* Ex. 2638 ¶¶ 53–54.

²⁶ Patent Owner notes that a protective order in the Texas Litigation was modified to allow “use of protected documents in the ‘pending IPRs—to the extent authorized by the Patent Trial and Appeal Board.” PO Resp. 71 n.10; *see also* Ex. 2731 (providing the modified protective order). Patent Owner adds that because “the modified district court protective order allows the use of [L]itigation discovery in Patent Owner’s possession to the extent the Board allows, in addition to documents the Board has ordered produced in discovery, Patent Owner’s expert declarations also address [e]xhibits . . . produced in the litigation for the Board’s consideration.” PO Resp. 71 n.10. Our analysis of Patent Owner’s contentions as to commercial success, including any of the declarants’ analyses that rely on the exhibits listed in footnote 10 of the Patent Owner Response, should in no way be construed as the Board authorizing Patent Owner to use these exhibits. The sole extent of any authorization from the Board to use confidential information from the Texas Litigation is presented in Paper 46.

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Petitioners respond that unclaimed features, such as comfort and durability, contributed to any commercial success. Pet. Reply 24–25. Petitioners contend that these unclaimed features of airbeds are extensively advertised and are consistently rated as more important to customers than a pump. *Id.* (citing Ex. 1649 ¶¶ 9–11, 19–39, ¶¶ 21–22 n.24–27; Ex. 1625 ¶¶ 154–156; Ex. 1650 ¶¶ 8–19).

For example, Petitioners argue that comfort and durability are the most important features of an airbed to customers and that Patent Owner fails to address Petitioners’ evidence that supports their position that unclaimed features are responsible for the commercial success. Pet. Reply 25. Petitioners argue that Patent Owner “equate[s] ‘built-in pumps’ with any ‘premium’ products that generate higher revenue and profits, including raised height airbeds.” *Id.* at 25 (citing Ex. 1649 ¶¶ 40–44, 66–69, 72). Petitioners contend that, contrary to this position, “the evidence demonstrates that numerous product features create ‘premium’ airbed products.” *Id.* (citing Ex. 1649 ¶¶ 40–44, 66–69, 72; Ex. 1670, 90, 91, 201, 202).

Petitioners also argue that Patent Owner did not “address whether market share was impacted when the claimed features were introduced to the market.” Pet. Reply 26. Petitioners argue that Intex’s growth in sales on which Patent Owner relies “is tied directly to Intex’s patented, comfort- and durability-focused Dura-Beam® product line—which is completely unrelated to the Challenged Claims.” *Id.* (citing Ex. 1649 ¶¶ 55–57, Schedules 2–4; Ex. 1650 ¶¶ 8–22; Exs. 1651, 1652, 1654).

Finally, Petitioners argue that “the vast majority of airbeds purchased by consumers do not have a ‘built-in pump’ (referred to by [Patent Owner]

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as ‘NBIP’ sales), further demonstrating that a ‘built-in pump’ (whether covered by the Challenged Claims or not) is not important to the majority of consumers.” Pet. Reply 26 (citing Ex. 1649 ¶¶ 45–54, 57).

In reply, Patent Owner argues that “Petitioners do not provide any credible economic evidence or analysis to support their assertion that unclaimed features create commercial success.” PO Surreply 23. Patent Owner contends that the unclaimed features “Petitioners mention are available in BIP airbeds that practice the claims and NBIP airbeds. Dr. Becker considered these other airbed features in his analysis.” *Id.* (citing Ex. 1648, 243:16–245:12). Patent Owner continues that “the data that Dr. Becker considered for [REDACTED] at Walmart accounts for these other features which are found in both BIP and NBIP airbeds.” *Id.* Patent Owner also replies that Petitioners’ arguments concerning market share and units sold are unavailing. *Id.* at 24. Patent Owner asserts that Petitioners’ admittedly infringing products amounts to approximately [REDACTED] [REDACTED] in sales. *Id.* at 19 (citing Ex. 1648, 69:8–24, 143:4–13).

In evaluating Patent Owner’s sales information *alone*, we recognize that Patent Owner shows the commercial success of certain airbeds that fall within the scope of some of the Challenged Claims based on the large revenues (approximately [REDACTED]) generated by sales of these certain airbeds. As we explain in greater detail in our analysis below, we find that the nexus between these sales and the claimed product features, however, is weak. Accordingly, the overall weight we attribute to the objective evidence of commercial success is not considerable.

First, as we explained above, the presumed nexus is associated with only those products for which Petitioners (and other defendants in the Texas

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Litigation) admit infringement. Second, based on our review of the complete record, we find that unclaimed features of the sold airbeds contribute, at least in part, to the commercial success of these airbeds, which further weakens the nexus and discounts the overall weight given to this objective evidence. *See* Reply 24–25. As Petitioners note, customer survey data, which indicate why a customer purchases an airbed, counter Patent Owner’s contentions. *See id.* at 24–25; *see, e.g.*, Ex. 2694 (providing research on the purchasing process of airbed customers), *cited at* Pet. Reply 24. For example, customer research shows that [REDACTED]

[REDACTED] Ex. 2694, 6; *see also id.* at 7 [REDACTED]. This research shows that comfort and durability outranks a built-in pump²⁷ in a listing of most important features. *See id.* at 10, 11.

Other record evidence also supports this finding. For example, Coleman customer research shows that, in addition to built-in pumps, which were “highly valued” (e.g., [REDACTED] [REDACTED] [REDACTED] Ex. 2692, 20, 22, 25; *see also* Ex. 2644, 15 (indicating that the most important features are

²⁷ We note that Coleman, the source of this information, disputes that any of its airbeds infringe the ’394 patent and, as we indicate in our analysis of nexus, the evidence of record does not demonstrate that any Coleman airbed falls within the scope of any Challenged Claims. *See* Ex. 2025, 3. Coleman’s use of the term “build in pump” in this survey analysis serves to illustrate that the term is not necessarily an analog for practicing the claims of the ’394 patent.

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comfort, durability, and not leaking air); Ex. 2696, 8 (indicating that airbed efficacy, including durability and comfort, is more important in brand preference than advanced pump features, including the pump being built into the mattress); Ex. 2697, 20 (indicating that customers would be willing to pay more for durability).²⁸ Our review of the totality of the evidence shows that features related to comfort and durability, as well as the type of pump, are considerations that contribute more significantly to the sales of airbeds at Walmart than a built-in pump.

We recognize that some of the evidence of record supports the position that customers are concerned with inflation or deflation times. *See, e.g.,* Ex. 2692, 25 [REDACTED]. This evidence does not effectively strengthen the nexus between the Challenged Claims and commercial success. Patent Owner does not direct us to persuasive evidence that this customer concern directly translates into a preference for airbeds that are covered by the Challenged Claims. Although a capability to do power inflation and deflation would address this concern, Patent Owner does not direct us to persuasive evidence linking a limitation recited in the '394 patent to decreased inflation or deflation times as compared to the prior art.

As Petitioners argue, Dr. Becker's testimony also supports our finding. Pet. Reply 24. For example, Dr. Becker testifies, "I would agree that . . . comfort and durability are important characteristics in consumer demand." Ex. 1648, 34:19–21. Dr. Becker further testifies that "[e]very

²⁸ These exhibits were cited by declarants' analyses. *See* Ex. 1625 ¶ 156; Ex. 1649 ¶¶ 21, 26–29, 39, 62, 67; Ex. 2029 ¶¶ 272–274, 278; Ex. 2638 ¶¶ 53, 55.

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manufacturer that I’ve reviewed in describing their products describes a number of different differentiating features of those products, not unlike what” Patent Owner did in terms of comfort and durability. *Id.* at 100:20–101:6. Dr. Stevick testifies consistent with this finding as well. *See* Ex. 1635, 372:3–14 [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].

We are persuaded by Petitioner’s argument that, between 2011 and 2018, Walmart sold more airbeds without built-in pumps as compared to airbeds with built-in pumps supports a finding that, when making an airbed purchase, customers consider factors *other than* whether the airbed has a built-in pump that will power inflate/deflate with a movable air conduit, as claimed in the Challenged Claims. Pet. Reply 26; Ex. 1649 ¶ 52. In this time period, [REDACTED] of airbed sales at Walmart were for airbeds without built-in pumps and sales for airbeds without built-in pumps had similar profit percentages as sales for airbeds with built-in pumps. *See* Ex. 1649 ¶ 52. This [REDACTED], on a per unit basis, supports an inference that customers’ purchases are driven, at least in part, by factors other than whether an airbed has a built-in pump with a movable air conduit, as recited in the Challenged Claims.

Finally, our finding of limited commercial success is consistent with the decision in binding arbitration between Petitioners and Patent Owner involving the ’394 patent (and other patents). In that proceeding, the arbitrator, [REDACTED]

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[REDACTED]
[REDACTED] Ex. 2765, 11.

At the same time, we are not persuaded by Petitioners’ argument that the increase in sales of Intex airbeds that included built-in pumps was attributable to its introduction of the DURA-BEAM® product line. Pet. Reply 26. Petitioners rely on declaration testimony from Mr. Schoettelkotte, their declarant with respect to economic analyses, and Mr. Slate, Intex’s Director of Sales, both of which reference data from Exhibits 1651 and 1652. *See* Ex. 1649 ¶¶ 55–57; Ex. 1650 ¶ 22. We cannot discern, without additional analysis from Petitioners or their declarants, how these data support Petitioners’ contention.²⁹

Third, we discount slightly the weight of this objective evidence because Patent Owner’s commercial success assertion includes a single retailer—Walmart—without any explanation as to the significance of the sales of this single retailer to the entire market. PO Resp. 70–71. Although Patent Owner contends that infringing airbeds make up “a significant portion of the overall airbed market and constitutes most airbed sales by revenue,” this contention is unsupported. *Id.* at 70 (citing Ex. 2638 ¶ 46). Dr. Becker’s declaration, at paragraph 46, likewise addresses Walmart sales only, not the “overall airbed market.” Ex. 2638 ¶ 46. As such, although we recognize that the amount of revenue from the Walmart sales is considerable and entitled to some weight, the lack of overall market share data cuts against the Walmart sales data. *See, e.g., Tec Air, Inc. v. Denso Mfg.*

²⁹ At oral hearing, Petitioners presented an analysis of their sales data to support their contention, which showed sales trends. *See* Tr. 122:20–24. That analysis, however, does not appear in Petitioners’ Reply.

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Michigan Inc., 192 F.3d 1353, 1360–61 (Fed. Cir. 1999) (“Based on Tec Air’s sales evidence [of millions of products sold], the jury reasonably could have found that the invention enjoyed commercial success. Denso argues that this evidence is insufficient because Tec Air failed to provide market share data. Although sales figures coupled with market data provide stronger evidence of commercial success, sales figures alone are also evidence of commercial success.”); *cf. In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996) (“This court has noted in the past that evidence related solely to the number of units sold provides a very weak showing of commercial success, if any.”).

We are persuaded, based on the complete record, that there is not a strong nexus between the revenue value for infringing products sold at Walmart and the patented invention. We find that the strength of any nexus is offset by the evidence of record concerning the impact of non-patented features on customer demand. In conclusion, we find that Patent Owner is entitled to some, but not considerable, weight with respect to the objective evidence of commercial success.

Failure to Develop Alternatives

Consideration of objective evidence of nonobviousness also includes “the failure of others to produce alternatives to the patented invention.” *GPAC Inc.*, 57 F.3d at 1580. As with other objective evidence, this evidence must demonstrate that any “inability or unwillingness of competitors” to develop alternative products “is rooted in the subject matter” of the Challenged Claims. *See id.* Patent Owner contends that Petitioners “attempted to design around the ’394 [p]atent but failed—they knew consumers would not accept a design without a permanently built in pump

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that followed the '394 [p]atent [c]laims.” PO Resp. 73–74 (citing Ex. 2029 ¶¶ 235, 262–266, App.).

In support of this contention, Patent Owner relies on Dr. Stevick’s testimony about Intex’s 619B and 619C pumps, which Intex developed as alternatives to its admittedly infringing pump. PO Resp. 73–74; Ex. 2029 ¶ 265. Dr. Stevick includes an analysis on how the 619C pump, as part of an airbed, would fall within the scope of claims 1–4, 6–12, 16–19, and 21–23 of the '394 patent. *See* Ex. 2029, App. Dr. Stevick further states that Petitioners did not develop any alternative similar to the products described in the prior art and asserted in this proceeding. *Id.* ¶ 265.³⁰

Petitioners respond that they developed noninfringing alternatives to a built-in pump as claimed in the Challenged Claims, and customers immediately purchased the products. Pet. Reply 27. As noted above, however, Dr. Stevick testifies that those alternative designs infringe each of the Challenged Claims and, [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED].
See Tr. 107:10–20; Ex. 2765, 14–16.

Patent Owner also states that “[f]or many years” competitors offered airbeds that fell within the scope of the '394 patent claims, and would not

³⁰ Dr. Stevick also testifies that “[e]ven 17 years after the patent was filed, in the face of litigation with the prospect of damages and possibly an injunction against their products, the market’s biggest companies . . . were unable to avoid the patent claims despite three different attempts to develop alternatives.” Ex. 2029 ¶ 266. We do not consider this statement at all, as it constitutes argument that should have been included in the Patent Owner Response. *See* Paper 77, 5.

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use alternatives, relying on paragraphs 260 to 266 of Dr. Stevick’s declaration. PO Resp. 71–72. Although some of these paragraphs are directed to the litigious nature of the field and an alternative design introduced by Petitioners after being sued for infringement, they do not show that the inability or unwillingness to develop alternatives was rooted in the subject matter of the Challenged Claims. *See* Ex. 2029 ¶¶ 260–266.

Patent Owner adds that “[t]he products in the market look nothing like the prior art asserted in this IPR—they follow the [Patent Owner’s] ’394 patented design.” PO Resp. 72 (citing Ex. 2029 ¶¶ 244–255; Exs. 2682–2686). Dr. Stevick’s testimony at paragraph 223 to 225, cited by Patent Owner, however, is not directed to whether a competitor’s products look like the prior art, as Patent Owner indicates. *See* Ex. 2029 ¶¶ 244–255 (discussing alleged commercial success).

We determine that this objective evidence is entitled to some weight. The record indicates that Petitioners [REDACTED]
[REDACTED]
[REDACTED] *See* Ex. 2029 ¶ 265, App.; Ex. 2765, 14–16. We note, however, contrary to Patent Owner’s assertion, that Patent Owner does not offer any direct evidence that Petitioners “knew consumers would not accept a design without a permanently built in pump.” PO Resp. 73–74. Although Patent Owner’s contention is not directly supported, we find, based on our review of the complete record, that Petitioners had an incentive to design around the ’394 patent and attempted to do so by making a minimal change to their designs, which supports at least an inference that customers would not have accepted a drastically different design. *See* Ex. 2029 ¶ 265; Ex. 2765, 14–16; *see also* Ex. 2634, Articles 5, 6 [REDACTED]

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[REDACTED]

[REDACTED]

The significance of this failure is tempered by the fact that the [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Accordingly, we find that there is limited nexus between this objective evidence and the limitations of the '394 patent.

Broad Acceptance, Praise, and Licensing

Industry acceptance of an invention may also provide an objective indicium of nonobviousness. *See Allen Archery, Inc. v. Browning Mfg. Co.*, 819 F.2d 1087, 1092 (Fed. Cir. 1987) (considering copying, praise, unexpected results, and industry acceptance as indicators of nonobviousness). Also, evidence that the industry praised a claimed invention or a product that embodies the patent claims weighs against an assertion that the same claim would have been obvious. *WBIP, LLC*, 829 F.3d at 1334. Praise from industry participants, especially competitors, is probative as to nonobviousness because such participants “are not likely to praise an obvious advance over the known art. Thus, if there is evidence of industry praise of the claimed invention in the record, it weighs in favor of the nonobviousness of the claimed invention.” *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1053 (Fed. Cir. 2016). Finally, “[l]icenses taken under

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the patent in suit may constitute evidence of nonobviousness; however, only little weight can be attributed to such evidence if the patentee does not demonstrate ‘a nexus between the merits of the invention and the licenses of record.’” *GPAC Inc.*, 57 F.3d at 1580 (quoting *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1539 (Fed. Cir. 1983)).

Patent Owner contends that its “patented products launched an entire category of ‘built-in pump’ airbeds.” PO Resp. 74 (citing Ex. 2638 ¶¶ 15, 16, 44–53). Patent Owner also contends that “Petitioners’ own witnesses testified about the value of the ’394 patented invention, an admission of non-obviousness.” *Id.* (citing Ex. 2638 ¶ 46; Ex. 2029 ¶¶ 179–259). Patent Owner adds that the sales figures show “broad consumer acceptance.” *Id.* Patent Owner continues that “[c]ompanies specifically tout the patented technology in their advertisements, including box art and photos highlighting the patented design.” *Id.* (citing Ex. 2029 ¶¶ 222–247; Exs. 2653, 2680–2687). Patent Owner also contends that its “patents in the pending [*inter partes* review proceedings] including the ’394 patent also have obtained more than [REDACTED] dollars in licensing.” PO Resp. 74–75 (citing Ex. 2638 ¶¶ 49–52; Ex. 2029 ¶ 284).

Petitioners respond that Patent Owner “points to no evidence that any licensing or alleged industry praise is the *direct* result of any claimed feature” (citing Ex. 1649 ¶¶ 61, 73–78) (emphasis added) and that “[t]he parties’ settlement agreement should be given no weight” (citing *Bosch Auto. Serv. Sols., LLC v. Matal*, 878 F.3d 1027, 1038 (Fed. Cir. 2017)). Pet. Reply 27.

We find that this objective evidence is entitled to little weight. With respect to Patent Owner’s contention that the invention of the ’394 patent

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launched an entire category of airbeds, the evidence of record does not support the contention. Although Patent Owner directs us to paragraphs 15, 16, and 44 to 53 in Dr. Becker’s declaration, we do not discern, and Patent Owner does not adequately explain, how this testimony supports the contention that the ’394 patent launched an entire category of airbeds. *See* PO Resp. 74; Ex. 2638 ¶¶ 15–16 (discussing Walmart products and sales), 44–53 (discussing Walmart sales and licensing).

As to Patent Owner’s contention that Petitioners’ witnesses testified about the value of the ’394 patented invention (PO Resp. 74), we afford this assertion no weight, as it is not supported by record evidence or improperly incorporates by reference argument from a declarant. To support its contention, Patent Owner references a large number of paragraphs from its declarants’ testimony—paragraph 46 of Dr. Becker’s declaration and over *eighty* paragraphs of Dr. Stevick’s declaration—but provides no further explanation. *See* PO Resp. 74 (referencing Ex. 2638 ¶ 46; Ex. 2029 ¶¶ 179–259); Ex. 2638 ¶ 46; Ex. 2029 ¶¶ 179–259. Based on our review of the referenced evidence, we find that it does not support Patent Owner’s contention.

Patent Owner also contends that “[c]ompanies specifically tout the patented technology in their advertisements, including box art and photos highlighting the patented design,” to support its position that the large sales experienced by their product was due to the patented technology. PO Resp. 74. The evidence relied on by Patent Owner is directed to the term “built-in pump” generally. Although inflation and deflation are mentioned in some of this evidence, Patent Owner fails to explain adequately how these references are tied to features recited in the Challenged Claims, such as the movable air

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conduit. Because Patent Owner’s argument is unsupported by the evidence of record, it is not given any weight. PO Resp. 74 (citing Ex. 2029 ¶¶ 222–247; Exs. 2653, 2680–2687).

Patent Owner’s evidence of large sales merely attempts to repackaging commercial success as a different indicium of nonobviousness—broad acceptance by consumers. We address commercial success in its own subsection, above.

Finally, we give little weight to the settlement agreement in the context of this indicium. Patent litigation provides risk and uncertainty for a party and settlement represents a way to reduce that risk and uncertainty, independent of any value the parties place on the patented invention. *See Bosch Auto.*, 878 F.3d at 1038 (Fed. Cir. 2017) (“[L]icensing, without more, is generally not a strong indication of nonobviousness if it cannot also be shown that the licensees did so out of respect for the patent rather than to avoid litigation expense.”). Here, Patent Owner fails to explain adequately how respect for the Challenged Claims, rather than avoiding litigation’s expense and risk, led to the settlement agreement.

In conclusion, we give the objective evidence associated with the indicia of nonobviousness for broad acceptance, industry praise, and licensing little weight.

Long-felt Need

Evidence of a long-felt but unsolved need tends to show nonobviousness because it is reasonable to infer that the need would have not persisted had the solution been obvious; however, “[a]bsent a showing of long-felt need or the failure of others, the mere passage of time without the

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claimed invention is not evidence of nonobviousness.” *See Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004).

Patent Owner contends that “[f]or decades the airbed industry sought after goals finally solved by the ‘394 patent, *i.e.*, recessed pump, holding air, not overheating efficiently enabling powered inflation and deflation in a short amount of time without undue size, noise, or expense” but no one “created a working, commercially viable product before Mr. Wang’s invention.” PO Resp. 75 (citing Ex. 2029 ¶¶ 256–259). Patent Owner adds, without further explanation, that “Petitioners’ own asserted motivations to combine are further proof that there was a need, but it was not met until the ‘394 patent.” *Id.*

Petitioners respond that Patent Owner’s declarant identifies the alleged long-felt need as “customer convenience,” which differs from the need identified in the Patent Owner Response and which was satisfied in the prior art. Pet. Reply 27.

We afford this objective evidence little weight. Patent Owner offers no persuasive evidence of a long-felt need for an inflatable product with a recessed pump that holds air and does not overheat, efficiently enabling powered inflation and deflation in a short amount of time, without undue size, noise, or expense. Our review of the cited paragraphs of Dr. Stevick’s testimony reveals that it merely describes prior art systems that differ from the Challenged Claims. *See e.g.*, Ex. 2029 ¶¶ 256–259. Dr. Stevick’s testimony does not direct us to any evidence of Patent Owner’s stated long-felt need or that others attempted to satisfy that need and failed. Indeed, as Petitioners point out, Dr. Stevick’s testimony seems to be directed to an alleged long-term need for “consumer convenience related to the pump.”

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Pet. Reply 27; *see* Ex. 2029 ¶ 256 (“[T]here was a long-felt need for consumer convenience related to the pump.”). We are persuaded by Petitioners’ argument that Dr. Stevick does not offer any evidence that even this alleged need existed. Pet. Reply 27.

For example, Dr. Stevick alleges that “[t]he problem persisted for over 100 years before” Mr. Wang (the named inventor of the ’394 patent) solved the problem, but Dr. Stevick’s testimony provides no evidentiary support that any problem existed. *See id.* ¶ 257. Although Dr. Stevick testifies that others failed, his testimony does not adequately explain why the previous designs did not provide customer convenience (the problem his testimony is directed to) or that the prior art solutions discussed even attempted to solve the problem of customer convenience. *See id.* Instead, Dr. Stevick’s testimony merely recounts the passage of time until the filing of the application that matured into the ’394 patent. *See id.*

In conclusion, we give the objective evidence associated with long-felt need little weight.

Skepticism of Others

“Evidence of industry skepticism weighs in favor of non-obviousness. If industry participants or skilled artisans are skeptical about whether or how a problem could be solved or the workability of the claimed solution, it favors non-obviousness.” *WBIP, LLC*, 829 F.3d at 1335. Patent Owner contends that “[c]onventional wisdom taught away from the ’394 patented design.” PO Resp. 75 (citing Ex. 2029 ¶¶ 285–290). Patent Owner argues that advantages of detachable pumps include that they work with multiple beds, result in smaller deflated beds, have lower costs, have higher efficiencies, and avoid overheating. *Id.* Patent Owner argues that these

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concerns weigh against a built-in pump design and, despite these concerns, Mr. Wang invented the claimed technology. *Id.*

We afford objective evidence of this indicium very little weight. First, even if we take the asserted disadvantages as true, such statements do not necessarily amount to credible evidence of industry skepticism or even arise to the level of teaching away from the Challenged Claims. Moreover, Patent Owner does not direct us to any persuasive evidence that the inflatable product industry was skeptical that a built-in pump with a movable air conduit could effectively be used with an inflatable product, such as an airbed.

Second, we afford Dr. Stevick’s testimony with respect to industry skepticism very little weight. Ex. 2029 ¶¶ 285–287. We find nothing in Dr. Stevick’s testimony in the cited paragraphs that directly addresses industry skepticism or teaching away from the Challenged Claims. Instead, this testimony merely identifies differences between the claimed inflatable product of the ’394 patent and prior art inflatable products. *See e.g.*, Ex. 2029 ¶¶ 285–287. Novelty over certain prior art does not equate to industry skepticism or an industry teaching away from a certain solution.

Paragraphs 288 and 289 of Dr. Stevick’s testimony allegedly recount conversations between Mr. Wang and his son, a general manager for Patent Owner. As Petitioners persuasively point out, we have no documentation of these conversations or any other corroborating evidence and, to the extent that Dr. Stevick accurately characterizes the conversations, the interests of these parties in the outcome of this proceeding causes us to greatly discount their unsworn statements. Pet. Reply 27–28 (arguing that Patent Owner “relies on uncorroborated, biased conversations its experts had with the

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named inventor and no other relevant evidence”). In conclusion, we give the objective evidence associated with skepticism of others very little weight.

Summary

Weighing all of the objective evidence, we determine, on the complete record, that Patent Owner is entitled to some, but not considerable, weight in favor of nonobviousness.

(9) Conclusion

For the reasons discussed above (§§ II.C.3.a.1–7), the evidence presented by Petitioners strongly indicates that claim 1 would have been obvious over Wu and Chaffee. For the reasons also discussed above (§ II.C.3.a.8), Patent Owner’s objective evidence weighs only slightly in favor of nonobviousness. When considering all of the evidence of obviousness and nonobviousness together (*see In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1079 (Fed. Cir. 2012)), we find Petitioners’ strong evidence of obviousness outweighs Patent Owner’s objective evidence of nonobviousness. Thus, we conclude Petitioners have demonstrated by a preponderance of the evidence that claim 1 would have been obvious over Wu and Chaffee.

b. Dependent Claims 2 and 3

Claim 2 depends from claim 1, and recites “wherein air flows from the interior region of the housing into the inflatable body when the air conduit is in the first position.” Ex. 1001, 8:40–42. Claim 3 depends from claim 1, and recites “wherein air flows from the inflatable body into the interior region of the housing when the air conduit is moved to the second position.” *Id.* at 8:43–46. Petitioners state that Wu as modified by Chaffee satisfies the additional limitations in these claims. Pet. 60.

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Referring to the discussion in the Petition of the “built into” limitation, the “interior region” limitation, the “air conduit” limitation, and the “wherein” limitation, Petitioners state that “air flows from gate member 200 of Wu to air mattress 400 during inflation and from air mattress 400 to gate member 200 during deflation, and this occurs when gate member 200 of Wu is disposed within the housing.” Pet. 60 (citing Ex. 1002 ¶¶ 236–237; Pet. 38–60). Therefore, according to Petitioners, “in combination, air flows from the interior region of the housing into Wu’s air mattress 400 when gate member 200 is in the first, inflating position, and from air mattress 400 into the interior region of the housing when Wu’s gate member 200 is in the second, deflating position.” *Id.* (citing Ex. 1002 ¶¶ 236–237; Pet. 38–60).

The record evidence, summarized above, supports Petitioners’ position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu as modified by Chaffee satisfies the limitations in claims 2 and 3. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 2 and 3 would have been obvious based on Wu and Chaffee.

c. Dependent Claims 4–6

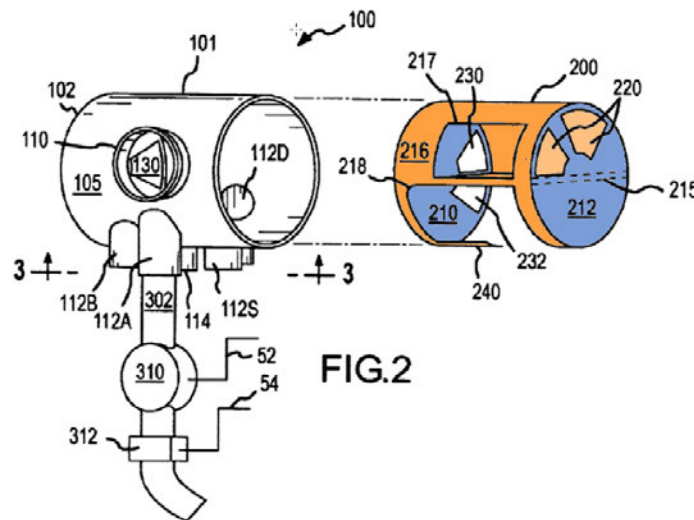
Claim 4 depends from claim 1, and recites “wherein the air conduit is a pipe.” Ex. 1001, 8:47–48. Claim 5 depends from claim 4, and recites “wherein the pipe is rotatable.” *Id.* at 8:49–50. Claim 6 depends from claim 4, and recites “wherein the pipe is a switching pipe.” *Id.* at 8:51–52. Petitioners state that Wu discloses the limitations in these claims. Pet. 61.

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As to claim 4, Petitioners refer to the discussion in the Petition of the “air conduit” limitation and state that “Wu’s gate member 200 is a movable air conduit.” *Id.* (citing Pet. 51–59; Ex. 1002 ¶¶ 238–242). Petitioners also provide the following annotated version of Figure 2 of Wu, with orange and blue overlay added to portions of gate member 200.



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District Court) that the term “pipe” *at least includes* a tubular or cylindrical object, part, or passage. The record evidence, summarized above, supports Petitioners’ position as to the limitation in this claim, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that gate member 200 in Wu falls within that understanding of the term “pipe.”

As to claims 5 and 6, Petitioners state that Wu describes gate member 200 “as being rotatable (Claim 5) and [as] a switching pipe (Claim 6).” Pet. 62 (citing Ex. 1002 ¶¶ 243–246; Ex. 1005, 5:9–10 (describing gate member 200 as “rotat[ing] within valve housing 101”), 6:5 (describing gate member 200 as being “turned” to a specific position), 4:53; Exs. 1068–69). “In other words,” according to Petitioners, “Wu described gate member 200 (the pipe, Claim 4) as switching, by rotation, between two positions for an inflate mode and a deflate mode (Claims 5 and 6).” Pet. 62.

The record evidence, summarized above, supports Petitioners’ position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu discloses the limitations in claims 4–6. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 4–6 would have been obvious based on Wu and Chaffee.

d. Dependent Claim 7

Claim 7 depends from claim 1, and recites “wherein the air conduit is arranged to convey air pumped by the fan and motor assembly.” Ex. 1001, 8:53–55. Petitioners refer to the discussion in the Petition of the “air

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conduit” limitation and state that “Wu disclosed that gate member 200 (the air conduit) conveys air pumped by the motorized blower 15 (the fan and motor) in both the inflate mode and deflate mode.” Pet. 62–63 (citing Pet. 51–59; Ex. 1002 ¶¶ 247–249). Petitioners also provide the same annotated version of Figure 1 of Wu provided in the discussion of the “air conduit” limitation (and provided above (*see supra* p. 48) showing inflation. Compare Pet. 64, with *id.* at 54. Referring to that annotated version of Figure 1, Petitioners contend that, when the system is in the inflation configuration, air routed from blower 15 to air mattress 400 “passes through and is conveyed by gate member 200.” *Id.* at 63 (citing Ex. 1005, 5:44–48, 5:56–6:4, 6:8–16).

The record evidence, summarized above, supports Petitioners’ position as to the limitation in this claim, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu discloses the limitation in claim 7. Patent Owner does not present arguments addressing this claim. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claim 7 would have been obvious based on Wu and Chaffee.

e. Dependent Claims 8 and 9

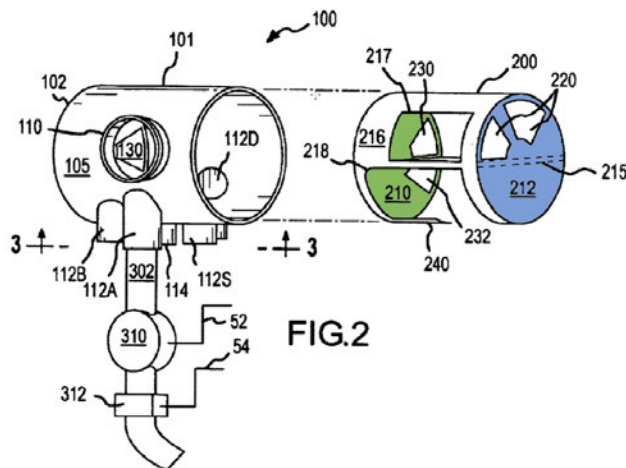
Claim 8 depends from claim 7, and recites “wherein the air conduit has a first end and a second end, and wherein the fan and motor assembly causes air to be conveyed from the first end of the air conduit to the second end of the air conduit when the air conduit is in the first position.” Ex. 1001, 8:56–60. Claim 9 depends from claim 8, and recites “wherein the fan and motor assembly causes air to be conveyed in sequence from ambient,

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through the first end of the air conduit, to the second end of the air conduit, and into the inflatable body when the air conduit is in the first position.” *Id.* at 8:61–65. Petitioners provide the following annotated version of Figure 2 of Wu, with blue overlay added to the identified “first end” and green overlay added to the identified “second end” of gate member 200.



Pet. 65 (citing Ex. 1005, 5:9–14, Fig. 2; Ex. 1002 ¶ 251). Figure 2 depicts a perspective view of rotary valve 100. Ex. 1005, 2:36–37, 4:60–61. Citing portions of the description of the inflating configuration in Wu, Petitioners explain how Wu discloses the airflow pathways recited in these claims. *See* Pet. 64–66 (citing Ex. 1005, 5:9–14, 5:60–6:4, Fig. 2; Ex. 1002 ¶¶ 250–259).

The record evidence, summarized above, supports Petitioners’ position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu discloses the limitations in claims 8 and 9. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 8 and 9 would have been obvious based on Wu and Chaffee.

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f. Dependent Claims 10 and 11

Claim 10 depends from claim 8, and recites “wherein the fan and motor assembly causes air to be conveyed from the second end of the air conduit to the first end of the air conduit when the air conduit is in the second position.” Ex. 1001, 8:66–9:2. Claim 11 depends from claim 10, and recites “wherein the fan and motor assembly causes air to be conveyed in sequence from the inflatable body, through the second end of the air conduit, to the first end of the air conduit, to ambient when the air conduit is in the second position.” *Id.* at 9:3–7. Petitioners provide the same annotated version of Figure 2 of Wu shown in the discussion of claims 8 and 9 above. *Compare* Pet. 67, *with id.* at 65. Citing portions of the description of the deflating configuration in Wu, Petitioners explain how Wu discloses the airflow pathways recited in these claims. *See id.* at 66–68 (citing Ex. 1005, 6:14–22, Fig. 2; Ex. 1002 ¶¶ 260–269).

The record evidence, summarized above, supports Petitioners’ position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu discloses the limitations in claims 10 and 11. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 10 and 11 would have been obvious based on Wu and Chaffee.

g. Dependent Claim 12

Claim 12 depends from claim 1, and recites “wherein the fan and motor are received in the housing.” Ex. 1001, 9:8–9. According to Petitioners, Wu as modified by Chaffee satisfies this limitation. Pet. 68

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(Ex. 1002 ¶ 270). Referring to the discussion in the Petition of the “interior region” limitation, Petitioners state that “in combination with Chaffee, Wu’s pump components (including Wu’s motorized blower 15) would be contained in a built in housing.” *Id.* (citing Pet. 41–45).

The record evidence, summarized above, supports Petitioners’ position as to the limitation in this claim, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu as modified by Chaffee satisfies this limitation. Patent Owner does not present arguments addressing this claim. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claim 12 would have been obvious based on Wu and Chaffee.

h. Claims 16–23

For independent claim 16 and claims 17–23, which depend from claim 16, Petitioners reference their positions with respect to claims 1–9, 11, and 12. *See* Pet. 68–69 (citing Ex. 1002 ¶¶ 271–286). For the same reasons discussed above, we find that Wu as modified by Chaffee satisfies the limitations of these claims. Patent Owner does not present arguments addressing these claims aside from the arguments discussed above as to claim 1. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 16–23 would have been obvious based on Wu and Chaffee.

D. ASSERTED OBVIOUSNESS OF CLAIMS 1–12 AND 16–23 BASED ON WU AND GOLDSMITH

Petitioners assert that claims 1–12 and 16–23 of the ’394 patent are unpatentable under 35 U.S.C. § 103(a) based on Wu and Goldsmith. Pet. 22,

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69–78; Pet. Reply 16–18. Patent Owner provides arguments specifically addressing this asserted ground. *See* PO Resp. 53–59; PO Surreply 14.

1. Goldsmith

In this ground, Petitioners rely on Goldsmith in addition to Wu (*see supra* § II.C.1). Goldsmith “relates to improvements in mattresses and has particular reference to the type known as ‘inner spring mattresses.’” Ex. 1007, 1:1–3. Goldsmith discloses providing an inner spring mattress with means “for blowing air of varying temperatures into the inner compartment of the mattress, and permitting such air to circulate through the said inner compartment, and to heat or cool the mattress to a temperature above or below the normal outside or surrounding temperature.” *Id.* at 1:4–12. Figure 1 of Goldsmith is reproduced below:

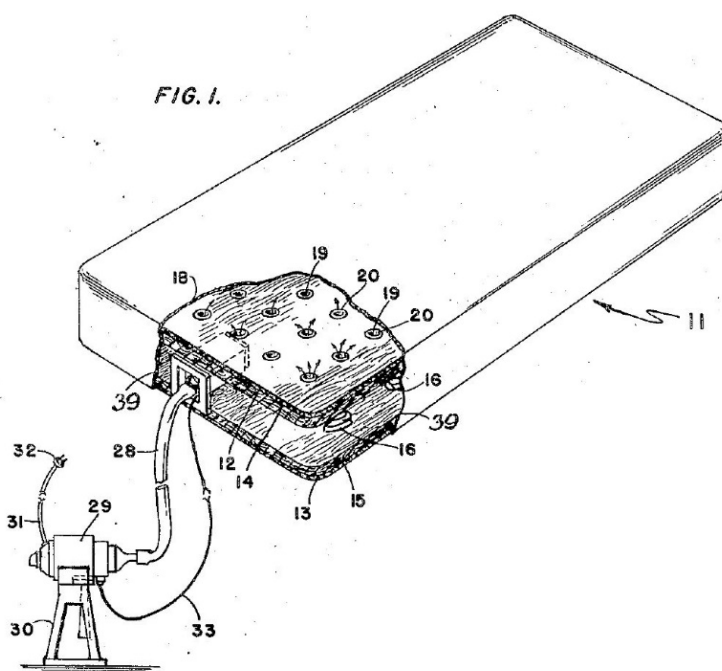


Figure 1 depicts “a perspective view, partly broken away, of a mattress and shows an air blowing mechanism attached thereto.” *Id.* at 2:19–21. As shown in Figure 1, Goldsmith discloses an embodiment in

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which blower unit 29 provides air to one end of inner spring mattress 11 via tube 28. *See id.* at 2:51–3:1. Goldsmith discloses that wall 39 “encircles the mattress and acts to prevent the air within the aforesaid air compartment 17 from escaping.” *Id.* at 3:25–28.

Figure 6 of Goldsmith is reproduced below:

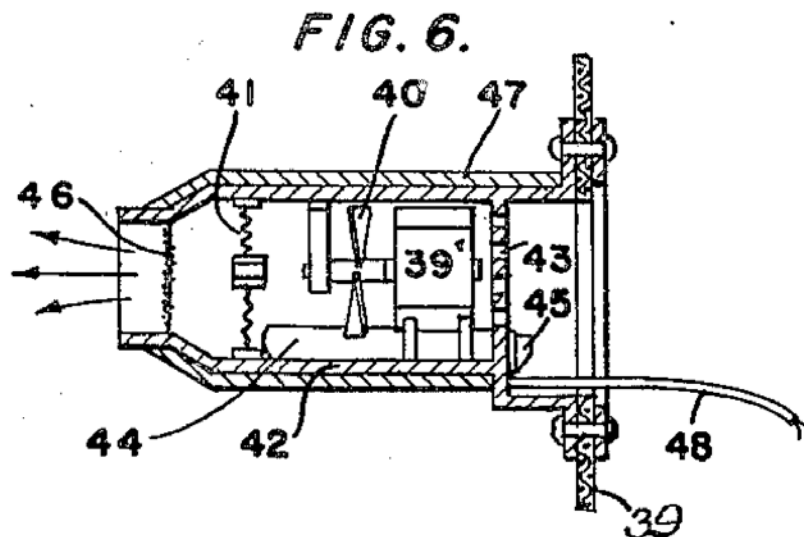


Figure 6 depicts a “sectional view showing a modified form of air distributing chamber which forms a part of th[e] invention.” *Id.* at 2:30–32. The alternative embodiment depicted in Figure 6 includes, among other aspects, motor 39’ and fan 40 inside distribution casing 42, which is “mounted or attached to the mattress” previously described. *Id.* at 4:1–5. Goldsmith states: “With this form set [shown in Figure 6] within the mattress, no outside [blower] unit is necessary.” *Id.* at 4:11–12.

2. Analysis

a. Independent Claim 1

Petitioners contend that the proposed combination of Wu and Goldsmith satisfies each of the limitations of independent claim 1. Pet. 69–

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77. To support their arguments, Petitioners identify certain passages in the cited references and explain the significance of each passage with respect to the corresponding claim limitation. *Id.* Petitioners also identify reasons why one of ordinary skill in the art at the time of the invention would have been motivated to modify Wu based on Goldsmith. *Id.* at 72–76. We address in turn below, the subject matter of each limitation in claim 1, then Petitioners’ identified reasons to modify Wu based on Goldsmith, and then objective evidence of nonobviousness.

(1) The “Inflatable Body” Limitation

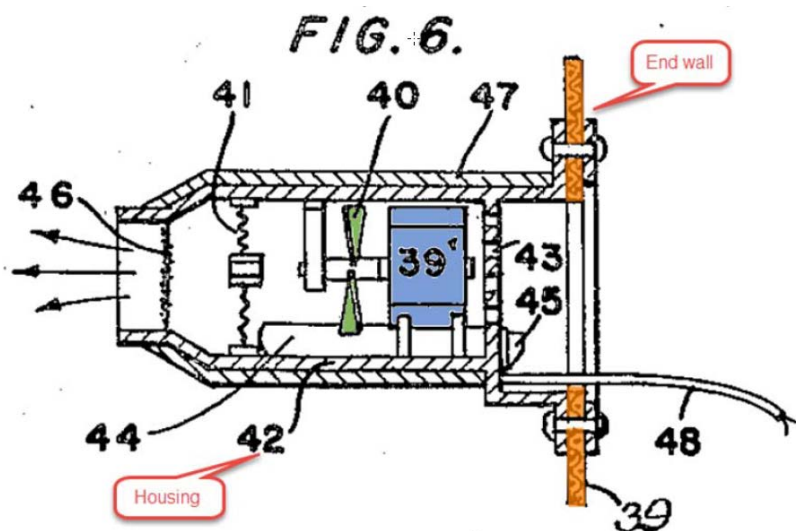
To address the “inflatable body” limitation for this asserted ground, Petitioners again rely on Wu and refer to their analysis of this limitation in the prior ground. Pet. 69 (citing Pet. 35–38; Ex. 1002 ¶¶ 293–294). Patent Owner relies on its arguments addressing this issue in the prior ground. *See* PO Resp. 59 (“The discussion of why Wu does not disclose an inflatable body as required by the claims is set forth above under Ground 1 and applies equally here.”). For the same reasons as above (*see supra* § II.C.3.a.1), we find, based on the complete record, that Wu discloses this limitation.

(2) The “Fan and Motor” Limitation

To address the “fan and motor” limitation for this asserted ground, Petitioners again rely on Wu and refer to their analysis of this limitation in the prior ground. Pet. 69 (citing Pet. 35–38; Ex. 1002 ¶¶ 293–294). For the same reasons as above (*see supra* § II.C.3.a.2), we find, based on the complete record, that Wu discloses this limitation. Patent Owner does not present arguments for this limitation.

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Petitioners assert that Wu as modified by Goldsmith satisfies the “built into” limitation. *See* Pet. 70–72, 74–76. Petitioners state that “Goldsmith’s casing 42 is ‘mounted or attached to the mattress’ air compartment walls 39 (orange in Fig. 6, below) by ‘rivets [] or by other suitable means’ and recessed therein via distribution casing 42 (the housing).” Pet. 74 (quoting Ex. 1007, 2:54–55, 4:1–5). Petitioners provide the following annotated version of Figure 6 of Goldsmith, with (1) end wall 39 overlaid in orange and identified with a text box, (2) casing 42 identified with a text box as “Housing,” and (3) fan 40 overlaid in green and motor 39 overlaid in blue:



Pet. 75. Figure 6 of Goldsmith depicts a “sectional view showing a modified form of air distributing chamber which forms a part of th[e] invention.”

Ex. 1007, 2:30–32. Petitioners argue that one of ordinary skill in the art “would have understood Goldsmith’s casing 42 to be built in, as rivets are permanent connections and ‘other suitable means’ suggests similar permanent connections.” Pet. 74 (citing Ex. 1007, 2:54–55, 4:1–5; Ex. 1002

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¶ 300; Ex. 1072, 23–24). According to Petitioners, one of ordinary skill in the art at the time of the invention “would have had numerous reasons for containing Wu’s pump components with a built in housing, as taught by Goldsmith, such that Wu’s housing contained pump structure was built into air mattress 400” of Wu. *Id.* at 75 (citing Ex. 1002 ¶ 301; Pet. 41–51, 72–74). We will discuss Petitioners’ reasoning below. *See infra* § II.D.2.a.7.

Patent Owner argues that even if combined, Wu and Goldsmith does not satisfy the “built into” limitation. PO Resp. 59. Specifically, Patent Owner argues that mattress 11 in Goldsmith “is not an inflatable body as it is not substantially airtight and beyond that is designed not to expand at all with air.” *Id.* According to Patent Owner, Goldsmith instead discloses “a traditional non-inflatable mattress that has holes in it so air can circulate through those hol[e]s for heating or cooling, with no air retained in the mattress.” *Id.* (citing Ex. 1007, 1:1–3, 1:13–19, 2:47–48). Patent Owner contends that because “Goldsmith does not disclose an ‘inflatable body[,]’ it also cannot disclose a housing that is ‘built into’ such a body.” *Id.*

As an initial matter, as discussed above, we do not construe “inflatable body” to include a “substantially airtight” requirement. *See supra* § II.B.1. Moreover, Patent Owner’s arguments are not convincing because they do not address specifically the modification proposed by Petitioners in this asserted ground. As discussed above, in this asserted ground, Petitioners rely on a *combination* of Wu and Goldsmith—rather than Goldsmith alone—to satisfy the “built into” limitation. *See, e.g.*, Pet. 70 (stating that “Wu in combination with Goldsmith discloses” the “interior region” limitation and the “built into” limitation), 75 (discussing “numerous reasons for containing Wu’s pump components with a built in housing, as

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taught by Goldsmith, such that Wu’s housing contained pump structure was *built into air mattress 400” of Wu* (emphasis added)); *see also Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1050 (Fed. Cir. 2019) (“A finding of obviousness . . . cannot be overcome ‘by attacking references individually where the rejection is based upon the teachings of a combination of references.’” (quoting *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986))); Pet. Reply 16 (“The combination of Wu and Goldsmith discloses a ‘housing built into the inflatable body,’ as Wu discloses an inflatable body in, for example, air mattress 400 . . . and Goldsmith teaches a housing built into a mattress.” (citing Ex. 1625 ¶¶ 88–92, 98–99)). For the reasons above, we find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu as modified by Goldsmith discloses the subject matter of the “built into” limitation.³²

(4) The “Interior Region” Limitation

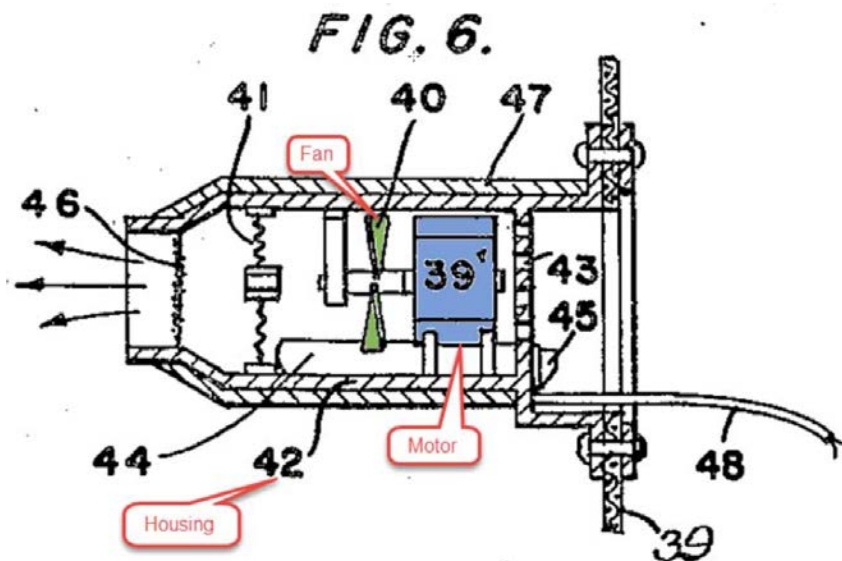
Petitioners assert that Wu as modified by Goldsmith satisfies the “interior region” limitation. *See* Pet. 70–74. Referring to the annotated version of Figure 6 of Goldsmith below, Petitioners state that “Goldsmith disclose[s] that the ‘air distributing chamber’ had an interior region containing ‘a motor 39’ [blue], fan 40 [green] . . . in a distribution casing [housing] 42.” Pet. 72 (citing Ex. 1007, 2:54–55, 4:1–5; Ex. 1002 ¶¶ 296–297). With the annotations, Petitioners (1) overlay fan 40 in green and identify that structure as “Fan,” (2) overlay motor 39’ in blue and identify that structure as “Motor,” and (3) identify casing 42 as “Housing.”

³² We address below Patent Owner’s arguments that one of ordinary skill in the art would not have modified Wu based on Goldsmith as proposed. *See infra* § II.D.2.a.7.

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Pet. 73. Figure 6 of Goldsmith depicts a “sectional view showing a modified form of air distributing chamber which forms a part of th[e] invention.”

Ex. 1007, 2:30–32. Petitioners assert that one of ordinary skill in the art

would have been motivated to apply Goldsmith’s teachings regarding the distribution casing 42 or a similar structure (i.e., the housing) with the pump components of Wu’s system 10 such that the rotary valve 100 (and, thus, movable gate member 200) and blower 15 in Wu were disposed inside a housing.

Pet. 73–74 (citing Ex. 1002 ¶¶ 298–299; Pet. 41–45). We will discuss Petitioners’ reasoning below. *See infra* § II.D.2.a.7.

The record evidence, summarized above, supports Petitioners’ position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu as modified by Goldsmith discloses the subject matter of the “interior region” limitation. Patent Owner does not dispute that

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Wu as modified by Goldsmith discloses the subject matter of this limitation.³³

(5) The “Air Conduit” Limitation

Petitioners state that Wu as modified by Goldsmith satisfies the “air conduit” limitation. Pet. 76 (citing Ex. 1002 ¶ 304). Referring to the discussion of this limitation in the context of the prior ground, Petitioners state that (1) “Wu disclosed an air conduit in the form of gate member 200 movable between a first and second position for inflation and deflation.” *Id.* (citing Ex. 1002 ¶¶ 302–303; Pet. 51–59). And, referring to the discussion of the “built into” and “interior region” limitations in the context of this asserted ground, Petitioners state that, “in combination with Goldsmith, Wu’s rotary valve 100 (which includes gate member 200) would be contained in a housing.” *Id.* (citing Ex. 1002 ¶ 303; Pet. 72–76). According to Petitioners, “in combination with Goldsmith, Wu’s gate member 200 (the air conduit) would be disposed in the housing, and gate member 200 would remain disposed within this housing when moved between the first and second positions during inflation and deflation.” *Id.* (citing Ex. 1002 ¶ 304).

The record evidence, summarized above, supports Petitioners’ position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu as modified by Goldsmith discloses the subject matter of the “air conduit” limitation. Patent Owner does not dispute that Wu as modified by Goldsmith discloses the subject matter of this limitation.

³³ We address below Patent Owner’s arguments that one of ordinary skill in the art would not have modified Wu based on Goldsmith as proposed. *See infra* § II.D.2.a.7.

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(6) The “Wherein” Limitation

Petitioners contend that Wu as modified by Goldsmith discloses the “wherein” limitation. Pet. 76–77. According to Petitioners,

Because air flows through gate member 200 of Wu during inflation and deflation and, when combined [with Goldsmith], rotary valve 100 (and, thus, gate member 200) of Wu is disposed within the housing, similar to Goldsmith’s teachings, as a result, air necessarily flows between the interior region of the housing and the inflatable body during inflation and deflation.

Id. (citing Ex. 1005, Fig. 1; Ex. 1002 ¶ 305).

The record evidence, summarized above, supports Petitioners’ position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu as modified by Goldsmith discloses the subject matter of the “wherein” limitation. Patent Owner does not dispute that Wu as modified by Goldsmith discloses the subject matter of this limitation.

(7) The Asserted Reasons to Modify Wu with Goldsmith

Petitioners argue that one of ordinary skill in the art at the time of the invention “would have been motivated by the built-in housing teachings of Goldsmith . . . to incorporate the pump components of system 10 of Wu (such as blower 15 and rotary valve 100) into a housing and build that housing into the inflatable body.” Pet. 72 (citing Ex. 1002 ¶¶ 287–291). As to the “interior region” limitation, Petitioners assert that one of ordinary skill in the art at the time of the invention “would have been motivated to apply Goldsmith’s teachings regarding the distribution casing 42 or a similar structure (i.e., the housing) with the pump components of Wu’s system 10 such that the rotary valve 100 (and, thus, movable gate member 200) and

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blower 15 in Wu were disposed inside a housing” for the same reasons discussed above in the context of the asserted ground of Wu and Chaffee for disposing Wu’s pump components inside the identified “housing” in Chaffee. *Id.* at 73–74 (citing Ex. 1002 ¶¶ 298–299; Pet. 41–45).

As to the “built into” limitation, Petitioners assert that a person of ordinary skill in the art at the time of the invention would have been motivated to “contain[] Wu’s pump components with a built in housing, as taught by Goldsmith, such that Wu’s housing contained pump structure was built into air mattress 400” of Wu, for the same reasons discussed above in the context of the asserted ground of Wu and Chaffee for disposing a “housing” with Wu’s pump components (based on Chaffee), such that the housing was “built into,” for example, air mattress 400 of Wu. *Id.* at 75–76 (citing Ex. 1002 ¶ 301; Pet. 41–51, 72–74).

First, Patent Owner argues that Goldsmith is nonanalogous art and, thus, that one of ordinary skill in the art would not have modified Wu based on Goldsmith. PO Resp. 54–58. “Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004).

As to the “field of endeavor” test, Petitioners state that “Goldsmith is from the same field of endeavor as Goldsmith discloses an air pump for an inflatable mattress.” Pet. 71 (citing Ex. 1007, 1:6–8, 3:25–28, 4:17–21; Ex. 1002 ¶¶ 25, 133, 134, 143–158). Patent Owner argues that mattress 11 in Goldsmith “does not expand” and that “Goldsmith is directed to a

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conventional inner spring non-inflatable air mattress with holes in it and a blower to circulate air through the holes for heating or cooling.” PO Resp. 54 (citing Ex. 1007, 1:13–19, 2:47–51; Ex. 2029 ¶ 139). Patent Owner highlights Petitioners’ reliance on paragraph 134 of the testimony of Dr. Beaman, which states that “Goldsmith’s mattress would necessarily and naturally expand, as the internal air pressure would build up around the ports 19 in the upper mattress layer.” Ex. 1002 ¶ 134, *quoted at* PO Resp. 55. Patent Owner argues that “Dr. Beaman gives no supporting facts or data for his opinion that the mattress would expand, and as such his testimony should be given little or no weight.” PO Resp. 55–56 (citing 37 C.F.R. § 42.65(a)). In the Reply, Petitioners do not address the “field of endeavor” test. *See* Pet. Reply 16–18. We find, based on the complete record, that Petitioners have not adequately demonstrated that Goldsmith is in the same field of endeavor as the ’394 patent.

Our inquiry is not complete, as we also consider whether Goldsmith satisfies the “reasonably pertinent” test. Petitioners state that one of ordinary skill in the art “would have viewed Goldsmith as reasonably pertinent to the problem [with which] the ’394 Patent is involved—i.e., building a fluid control device into an inflatable body to overcome problems that arise when the pump/fluid control device is separate from the inflatable body.” Pet. 71–72 (citing Ex. 1001, 1:22–28; Ex. 1007, 4:11–12; Ex. 1002 ¶ 135). Patent Owner argues that Goldsmith is not “reasonably pertinent to the problem faced by the inventor of the ’394 Patent, which was to provide a modified air mattress having a built-in electric air pump.” PO Resp. 57 (citing Ex. 1001, 1:16–27). Patent Owner states: “Petitioners note that one embodiment of Goldsmith includes a blower bolted into the side of the

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mattress and stating ‘no outside [blower] unit is necessary.’ Ex. 1007, 4:11–12. But the problems are not related.” PO Resp. 57–58. According to Patent Owner, “Goldsmith has a hard structure for a coil spring mattress to mount a blower for blowing hot and cold air and has no issue with retaining air in the bed,” whereas “[i]n contrast, the ’394 patent inventor had to come up with an approach for mounting its pump in a substantially airtight way that allows for inflation of its mattress.” *Id.* at 58. Patent Owner also argues that “Goldsmith’s bed uses traditional materials for its coil spring bed (for 1945)” and that, “[i]n contrast[,], an airbed has lighter, and less durable materials for creating the inflatable chamber of the airbed.” *Id.* (citing Ex. 2029 ¶ 144).

Based on a passage in the Description of the Related Art section of the ’394 patent (cited by both Petitioners and Patent Owner), we find that one problem with which the inventor of the ’394 patent was involved was providing a built-in air pump to thereby eliminate the need for an external pump. Ex. 1001, 1:20–27. We are persuaded by Petitioners’ contention that the relied-upon embodiment of Goldsmith (Figure 6) is reasonably pertinent to that same problem. Pet. Reply 17 (“Goldsmith is reasonably pertinent to an undisputed problem identified in the ’394 Patent: to provide a built-in air pump to thereby eliminate the need for an external pump.”). Indeed, the passage from Goldsmith cited by Petitioners highlights how, in the relied-upon embodiment, “no outside [blower] unit is necessary.” Ex. 1007, 4:11–12.

Patent Owner improperly limits the problem at issue to providing a built-in air pump to a “modified air mattress.” PO Resp. 57; *see also id.* at 58 (arguing that “an *airbed* has lighter, and less durable materials” than

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Goldsmith (emphasis added)). With this argument, however, Patent Owner restricts the problem at issue to *only one* of the several embodiments or applications disclosed in the '394 patent. *See, e.g.*, Ex. 1001, 4:13–16 (discussing “an inflatable product of a third embodiment of the present invention” shown in Figures 3A and 3B), 4:39–43 (discussing “an inflatable product of a fourth embodiment of the present invention [that] is an air mattress,” as shown in Figure 4A), 7:20–21 (discussing “an inflatable product of a ninth embodiment of the present invention [that] is an umbrella”). In light of the record here, we agree with Petitioners that the scope of analogous art is not so limited. *See* Pet. Reply 17 (“In short, [Patent Owner] argues that Goldsmith is not reasonably pertinent because it is not an airbed.” (citing PO Resp. 57–58; Ex. 1625 ¶¶ 93–94)); *see also Graham*, 383 U.S. at 35 (rejecting the argument that the cited references were not “pertinent prior art” and stating that “[t]he problems confronting [the patentee] and the insecticide industry were not insecticide problems; they were mechanical closure problems”). For these reasons, we find, on the complete record, that Goldsmith is analogous art.

Second, Patent Owner contends that “[t]here is [n]o [m]otivation to [c]ombine Wu and Goldsmith.” PO Resp. 58–59. Specifically, Patent Owner argues that, for this ground, “Petitioners assert, without elaboration, that the same motivations for comb[in]ing Wu and Chaffee apply to combining Wu and Goldsmith.” *Id.* at 58 (citing Pet. 75). According to Patent Owner, “[i]t is improper to, without analysis and in a completely conclusory matter, simply cross apply Wu to Goldsmith, and the Board should not allow it.” *Id.* at 58–59. Patent Owner states, “[w]ere one to follow that ill-adv[is]ed path, the above discussion of why one would not

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combine Wu with Chaffee would then apply here as well.” *Id.* at 59 (citing Ex. 2029 ¶ 147).

We do not agree with Patent Owner as to the alleged per se impropriety of Petitioners’ reliance, in the context of this asserted ground, on the same reasoning statements provided in the context of the ground of Wu and Chaffee. In both this asserted ground and the ground of Wu and Chaffee, Petitioners contend that one of ordinary skill in the art would have modified Wu in a *similar way* based on *similar teachings* in both Chaffee and Goldsmith. *Compare, e.g.*, Pet. 41 (discussing how one of ordinary skill in the art “would have been motivated by these teachings of Chaffee (described in more detail, below) to incorporate blower 15 and rotary valve 100 of Wu into a housing and build that housing into Wu’s inflatable body” (citing Ex. 1002 ¶ 188)), *with id.* at 72 (stating that one of ordinary skill in the art “would have been motivated by the built-in housing teachings of Goldsmith . . . to incorporate the pump components of system 10 of Wu (such as blower 15 and rotary valve 100) into a housing and build that housing into the inflatable body” (citing Ex. 1002 ¶¶ 287–291)).³⁴

Moreover, given the similarities in the proposed modifications of Wu in each of the two grounds here, for the reasons discussed above (*see supra* § II.C.3.a.7), we determine, in light of the complete record, that Petitioners have shown that one of ordinary skill in the art at the time of the invention would have been motivated to modify Wu based on Goldsmith, as proposed,

³⁴ We note that Patent Owner did not explain why any of the specific reasoning statements provided by Petitioners in the context of the asserted ground based on Wu and Chaffee was inapplicable in the context of the ground based on Wu and Goldsmith. *See* Inst. Dec. 48.

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for at least the purposes of improved spatial efficiency and improved durability.

(8) Objective Evidence of Nonobviousness

The analysis of Patent Owner’s objective evidence of nonobviousness is the same for this asserted ground as for the prior asserted ground. Thus, for the same reasons discussed above (§ II.C.3.a.8), we determine, on the complete record, that Patent Owner is entitled to some, but not considerable, weight in favor of nonobviousness.

(9) Conclusion

For the reasons discussed above (§§ II.D.2.a.1–7), the evidence presented by Petitioners strongly indicates that claim 1 would have been obvious over Wu and Goldsmith. For the reasons also discussed above (§ II.D.2.a.8), Patent Owner’s objective evidence weighs only slightly in favor of nonobviousness. When considering all of the evidence of obviousness and nonobviousness together (*see Cyclobenzaprine*, 676 F.3d at 1079), we find Petitioners’ strong evidence of obviousness outweighs Patent Owner’s objective evidence of nonobviousness. Thus, we conclude Petitioners have demonstrated by a preponderance of the evidence that claim 1 would have been obvious over Wu and Goldsmith.

b. Dependent Claims 2 and 3

Petitioners state that Wu as modified by Goldsmith satisfies the additional limitations in these claims. Pet. 77. Referring to the discussion in the Petition of the “built into” limitation, the “interior region” limitation, the “air conduit” limitation, and the “wherein” limitation in the context of the asserted ground of Wu and Chaffee as well as the discussion in the Petition of the “air conduit” limitation and the “wherein” limitation in the context of

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this asserted ground, Petitioners state that “air flows from gate member 200 of Wu to air mattress 400 when gate member is in the first, inflating position, and from air mattress 400 to gate member 200 when gate member is in the second, deflating position, and this occurs when gate member 200 of Wu is disposed within the housing as taught by Goldsmith.” *Id.* (citing Ex. 1002 ¶¶ 307–308; Pet. 38–60, 76–77). Therefore, according to Petitioners,

in combination, air flows from the interior region of the housing, similar to Goldsmith’s, into Wu’s air mattress 400 (the inflatable body) when gate member 200 is in the first, inflating position, and from Wu’s air mattress 400 to the interior region of the housing, similar to Goldsmith’s, when gate member 200 is in the second, deflating position.

Id. (citing Ex. 1002 ¶¶ 236–237; Pet. 38–60, 76–77).

The record evidence, summarized above, supports Petitioners’ position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu as modified by Goldsmith satisfies the limitations in claims 2 and 3. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 2 and 3 would have been obvious based on Wu and Goldsmith.

c. Dependent Claims 4–11

Referring to the discussion in the Petition of dependent claims 4–11 in the context of the asserted ground of Wu and Chaffee, Petitioners state that “Wu alone satisfies all of the limitations” of these claims. Pet. 78 (citing Ex. 1002 ¶ 309; Pet. 60–68). For the same reasons discussed above (*see*

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supra § II.C.3.c–f), we find that Wu discloses the limitations in claims 4–11. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 4–11 would have been obvious based on Wu and Goldsmith.

d. Dependent Claim 12

According to Petitioners, Wu as modified by Goldsmith satisfies this limitation. Pet. 78. Referring to the discussion in the Petition of the “interior region” limitation and the “built into” limitation in the context of this asserted ground, Petitioners state that “as combined with Goldsmith, Wu’s pump components (including Wu’s motorized blower 15) would be contained in a built in housing (e.g., similar to casing 42 taught by Goldsmith)” such that “in combination, Wu and Goldsmith disclosed that motorized blower 15 (the fan and motor) are received in the housing.” *Id.* (citing Ex. 1002 ¶ 310; Pet. 70–76).

The record evidence, summarized above, supports Petitioners’ position as to the limitation in this claim, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Wu as modified by Goldsmith satisfies the limitation in claim 12. Patent Owner does not present arguments addressing this claim. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claim 12 would have been obvious based on Wu and Goldsmith.

e. Claims 16–23

For independent claim 16 and claims 17–23, which depend from claim 16, Petitioners reference their positions with respect to claims 1–9, 11,

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and 12. *See* Pet. 78 (citing Ex. 1002 ¶¶ 311–312; Pet. 68–69). For the same reasons discussed above, we find that Wu as modified by Goldsmith satisfies the limitations of these claims. Patent Owner does not present arguments addressing these claims aside from the arguments discussed above as to claim 1. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 16–23 would have been obvious based on Wu and Goldsmith.

E. ASSERTED OBVIOUSNESS OF CLAIMS 1–12 AND 16–23 BASED ON
WU, GOLDSMITH, AND CHAFFEE

Petitioners assert that claims 1–12 and 16–23 of the ’394 patent are unpatentable under 35 U.S.C. § 103(a) based on Wu, Goldsmith, and Chaffee. Pet. 22, 87–89. Petitioners present this asserted ground “as an alternative” to the asserted ground based on Wu and Goldsmith “and only to the extent that: (1) the Board construes ‘inflatable body’ to mean a substantially airtight structure that expands when filled with air or other gases; and (2) the Board determines that Wu does not disclose such a structure.” *Id.* at 87–88. We instituted on this ground as well as the three asserted grounds above. Inst. Dec. 60–62.

As discussed above (*see supra* § II.B.1), we do not construe “inflatable body” to include a “substantially airtight” requirement. Because Petitioners seek consideration of this asserted ground “only to the extent that” we construe “inflatable body” to include a “substantially airtight” requirement (Pet. 87), we do not further address this asserted ground. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1357 (2018) (stating that “the petitioner’s contentions . . . define the scope of the litigation all the way from institution through to conclusion”).

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F. ASSERTED OBVIOUSNESS OF CLAIMS 1–12 AND 16–23 BASED ON WU AND PARIENTI

Petitioners assert that claims 1–12 and 16–23 of the '394 patent are unpatentable under 35 U.S.C. § 103(a) based on Wu and Parienti. Pet. 22, 79–87; Pet. Reply 18–22. Patent Owner provides arguments specifically addressing this asserted ground. *See* PO Resp. 59–67; PO Surreply 14–18. Because the grounds based on Wu and Chaffee, and Wu and Goldsmith are dispositive as to all the Challenged Claims, we need not reach the ground based on Wu and Parienti. *See SAS*, 138 S. Ct. at 1359 (holding that a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *see also, e.g., SK Hynix Inc. v. Netlist, Inc.*, IPR2017-00692, Paper 25 at 40 (PTAB July 5, 2018) (determining all challenged claims to be unpatentable and not addressing additional grounds).

G. MOTIONS TO EXCLUDE EVIDENCE

1. Petitioners’ motion to exclude evidence

Petitioners filed a motion to exclude certain exhibits that Petitioners contend are not cited in the Patent Owner Response, Surreply, or any expert declaration. Paper 97, 1. Petitioners seek to exclude this evidence as irrelevant under Federal Rules of Evidence Rules 401 and 402. *Id.* (the “Uncited Exhibits”). Petitioners also argue that certain paragraphs in Ex. 2029 (Dr. Stevick’s Declaration) and Ex. 2638 (Dr. Becker’s Declaration) should be excluded. *Id.* at 2–6 (the “Declaration Portions”).

a. Uncited Exhibits

With respect to the Uncited Exhibits, Petitioners argue that prior Board decisions provide that exhibits not cited in a patent owner’s papers should be excluded. Paper 97, 1–2.

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In opposition, Patent Owner argues, with respect to certain of the Uncited Exhibits, that these exhibits are exhibits to depositions. Paper 102, 1. Specifically, Patent Owner argues that Exhibits 2030, 2031, 2032, 2033, and 2751 are exhibits to Dr. Beaman’s deposition testimony (Exhibits 2040 and 2753). *Id.* Patent Owner adds that Petitioners did not properly object to the evidence, as they did not object to the evidence during the depositions. *Id.* at 2.³⁵

Petitioners reply that, as to the Uncited Exhibits, Patent Owner addresses only a subset of the exhibits covered in Petitioners’ motion. Paper 105, 1 n.1 (identifying Exs. 2043, 2044, and 2748 as uncontested by Patent Owner). As to the contested exhibits, Petitioners argue that Patent Owner does not identify where in its papers it relies on Dr. Beaman’s testimony directed to any of the exhibits challenged by the motion. *Id.* at 2. Petitioners argue that, without reliance on these sections, the exhibits should be excluded. *Id.* at 2–3.

Petitioners maintain that Patent Owner’s argument that Petitioners failed to object at the deposition is nonsensical. Paper 105, 3. Petitioners argue that they could not have known at the time of the deposition that Patent Owner would not rely on those exhibits in its later-filed papers. *Id.* at 3–4.

As to Exhibits 2043, 2044, and 2748, which are not contested by Patent Owner, we deny Petitioners’ motion as moot, as we do not rely on them in this Decision. *See* Trial Practice Guide Update, 17 (“In the Board’s

³⁵ Patent Owner does indicate that Exhibit 2030 was objected to at the deposition, but on the basis that it was derived from a different proceeding. Paper 102, 2.

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experience, consideration of the objected-to evidence is often unnecessary to resolve the patentability of the challenged claims, and the motion to exclude is moot.”).

We also deny Petitioners’ motion as to the other Uncited Exhibits (Exhibits 2030, 2031, 2032, 2033, and 2751). As Patent Owner explains, these exhibits were used in conducting Dr. Beaman’s depositions (Ex. 2040 and Ex. 2753) and the complete deposition transcripts are in the record. Although we do not rely on these exhibits in our Decision, we do rely on Dr. Beaman’s depositions. We determine that it is proper to maintain Exhibits 2030, 2031, 2032, 2033, and 2751 in the record, as they are relevant to testimony in the depositions, even if that testimony is not ultimately relied upon by Patent Owner or Petitioners in this proceeding. If we followed Petitioners’ reasoning, in cases where a deposition or declaration covers multiple, related proceedings, portions of those exhibits would need to be removed to the extent they do not apply to any one proceeding. Similarly, to the extent that a line of questioning in a deposition or testimony in a declaration eventually is not used to support a party’s position, that evidence would need to be excluded from the record. Such an approach would make dealing with evidence, particularly evidence entered in multiple proceedings as we have here, cumbersome for the parties to manage. Accordingly, we determine that we will maintain in the record of this proceeding the complete record of Dr. Beaman’s depositions, including the associated exhibits.

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b. Declaration Portions

With respect to the Declaration Portions, Petitioners argue that this evidence represents arguments that are improperly incorporated by reference by Patent Owner. Paper 97, 2–6.

Patent Owner argues that a motion to exclude evidence is not the proper vehicle to address incorporation by reference. Paper 102, 3. Patent Owner explains that we ruled on a motion to strike directed to the Declaration Portions. *Id.*; *see* Paper 77 (providing an Order denying Petitioners’ motion to strike). Patent Owner also argues that Petitioners’ motion improperly incorporates arguments from its motion to strike. Paper 102, 4–5. Finally, Patent Owner argues that it did not improperly incorporate arguments from its experts’ declarations. *Id.* at 5–9. Petitioners’ Reply reiterates that the Declaration Portions were improperly incorporated by reference into the Patent Owner Response. Paper 105, 4–5.

We deny Petitioners’ motion to exclude the Declaration Portions. Motions to exclude evidence are used to exclude evidence that is not admissible. *See* Trial Practice Guide Update, 16–17. Petitioners do not argue that the Declaration Portions represent *inadmissible* evidence. Paper 97, 2–6. Instead, Petitioners argue that the Declaration Portions represent improper *argument*, rather than evidence. *See* Paper 97, 2–6. Petitioners fail to provide any basis under the Federal Rules of Evidence as to why the Declaration Portions are inadmissible. *See id.*; Trial Practice Guide Update, 16 (“A motion to exclude must explain why the evidence is not admissible (e.g., relevance or hearsay).”). Although Petitioners did object to Exhibits 2029 and 2638, these objections were directed to bases under the Federal Rules of Evidence not argued in their motion. *See* Paper 55, 1, 18–19. As

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such, we are unclear as to why Petitioners contend that the Declaration Portions are inadmissible.

Petitioners appear to use the motion to exclude to reargue their motion to strike, this time trying to exclude the underlying declaration paragraphs, rather than the sections of the Patent Owner Response that allegedly incorporate by reference these paragraphs. *See id.*; *see also* Paper 77 (providing our decision on Petitioners’ motion to strike portions of the Patent Owner Response). We already addressed their motion to strike and how we would address any arguments improperly incorporated by reference. Paper 77.

2. Patent Owner’s motion to exclude evidence

We now turn to Patent Owner’s motion to exclude evidence. In this motion, Patent Owner first “objects to Exhibits 1665–1669 on the ground that they contain improper attorney argument in violation of the page/word count limits for replies.” Paper 99, 1. Second, Patent Owner contends that Exhibit 1625, Dr. Beaman’s declaration supporting the Reply, mischaracterizes certain earlier testimony of Patent Owner’s expert and exceeds the proper scope of a reply. *Id.* at 3. Third, Patent Owner objects, provisionally, to Exhibit 1650, a declaration by Ryan Slate, because Patent Owner was not afforded an opportunity to depose the declarant. *Id.* at 4–5.³⁶ Fourth, Patent Owner contends that Exhibits 1651–1654 and 1679 include hearsay, are irrelevant, are unfairly prejudicial, and lack foundation. *Id.* at 5. Fifth, Patent Owner contends that Exhibits 1068, 1069, and 1070, and

³⁶ Patent Owner does not address this evidence in reply to Petitioners’ contention that this objection should be withdrawn. *See* Paper 103, 6; Paper 106. We do not address this exhibit further.

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references to these exhibits in Ex. 1002, should be excluded under Federal Rules of Evidence 402, 403, and 1002. *Id.* at 10. Sixth, and finally, Patent Owner argues that Exhibit 1011 should be excluded under Federal Rules of Evidence 1002 and 1003. *Id.* at 11. We address each of these categories in turn, below.

In opposition to this motion, Petitioners argue that Patent Owner's motion to exclude fails to follow our rules and procedures for a motion to exclude and that we should deny the motion, in its entirety, on that basis. Paper 103, 1–2 (quoting Office Patent Trial Practice Guide, 77 Fed. Reg. at 48,767). We decline to deny Patent Owner's motion on this basis. We note that Petitioners' motion, which we addressed above, also fails to follow the procedure outlined in the Office Patent Trial Practice Guide. *See* Paper 97.

a. Exhibits 1665–1669

Patent Owner argues that Exhibits 1665 through 1669 improperly incorporate attorney argument into Petitioners' Reply. Paper 99, 1–3. These exhibits are directed to Petitioners' allegations that Patent Owner improperly incorporates arguments from declarations into its Patent Owner Response. *See id.*

In opposition, Petitioners argue that Patent Owner does not cite any evidentiary basis for excluding these exhibits and that a motion to exclude is not the proper procedure to challenge these exhibits. Paper 103, 12 (referencing Trial Practice Guide Update, August 2018). Patent Owner replies that, by filing Exhibits 1665–1669, Petitioners exceeded the word count for a Reply. Paper 106, 2.

We do not exclude Exhibits 1665–1669. Patent Owner provides no evidentiary basis why these exhibits constitute inadmissible evidence. To

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the extent that these exhibits do contain attorney argument, the proper remedy in such a situation is for us, when considering Petitioners' Reply arguments and evidence as a whole, to not consider any "arguments" found only in these exhibits and not adequately explained in the Reply. *See* Trial Practice Guide Update, 17–18; *cf.* Paper 77, 5 (addressing Petitioners' motion to strike).

b. Exhibit 1625

Patent Owner argues that Dr. Beaman's reply declaration mischaracterizes testimony from Patent Owner's declarant in support of its preliminary response (Dr. Durfee), based on characterizations of the testimony from Petitioners' counsel. Paper 99, 3–4. Patent Owner also argues that addressing Dr. Durfee's testimony, which was not relied on in the Patent Owner Response, is outside the scope of a proper reply. *Id.* at 3.

Petitioners argue that Patent Owner does not provide a basis under the rules of evidence to exclude Dr. Beaman's testimony. Paper 103, 5. Petitioners add that a motion to exclude should not be directed to arguments or evidence that a party believes exceeds the proper scope of a reply. *Id.* Finally, Petitioners argue that the testimony sought to be excluded identifies inconsistencies between Patent Owner's declarants' testimony. *Id.* at 6.

In reply, Patent Owner argues that Dr. Beaman's testimony lacks foundation. Paper 106, 3.

We do not exclude this evidence. Patent Owner did not rely on a lack of foundation in its objection to Dr. Beaman's testimony or in the original motion to exclude. *See* Paper 88, 5 ("Team Worldwide objects to the Reply Declaration of Joseph J. Beaman, Jr. (Exhibit 1625), which mischaracterizes Exhibit 2001 and/or exceeds the proper scope of reply"); Paper 99, 3–4

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(contending that portions of Ex. 1625 “mischaracterizes Patent Owner’s early expert testimonial evidence (Exhibit 2001) and/or exceeds the proper scope of reply”). Accordingly, Patent Owner does not identify an evidentiary basis to exclude the evidence. Also, neither the motion nor the objection identifies, with particularity, those portions of Dr. Beaman’s declarations to be excluded, as Patent Owner’s citations were presented as exemplary only. *See id.*

c. Exhibits 1651–1654 and 1679

Patent Owner argues that Exhibits 1651–1654 should be excluded as hearsay, are irrelevant, and lack proper foundation. Paper 99, 5. Patent Owner also argues that Exhibit 1679 does not lay the proper foundation for these exhibits. *Id.* at 8.

We deny Patent Owner’s motion as to these exhibits as moot, as we do not rely on them in this Decision. *See* Trial Practice Guide Update, 17 (“In the Board’s experience, consideration of the objected-to evidence is often unnecessary to resolve the patentability of the challenged claims, and the motion to exclude is moot.”).³⁷

d. Exhibits 1068, 1069, and 1070, and references to these exhibits in Ex. 1002

Patent Owner argues that Exhibits 1068, 1069, and 1070, and references to these exhibits in Exhibit 1002 should be excluded, as Exhibits

³⁷ Although we discuss Exhibits 1651 and 1652 above (*see supra* p. 83), we determine that Petitioners have not shown how those exhibits support their argument. Because our discussion above does not rely on Exhibits 1651 and 1652 in the overall determination as to unpatentability, and to maintain a complete record of this proceeding, we do not exclude these exhibits.

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1068, 1069, and 1070 are animations that do not accurately or completely represent the evidence underlying the animations. Paper 99, 10–11. We deny Patent Owner’s motion as to these exhibits as moot, as we do not rely on them in this Decision. *See* Trial Practice Guide Update, 17.

e. Exhibit 1011

Patent Owner argues that Exhibit 1011 should be excluded under Federal Rule of Evidence 1002 “as not being an original” and under Federal Rule of Evidence 1003 “as not being an admissible duplicate due to it being an inaccurate copy with portions of the document cut off.” Paper 99, 11 (discussing Ex. 1011, 11 (and “odd numbered pages following that”). We deny Patent Owner’s motion as to this exhibit as moot, as we do not rely on it in this Decision. *See* Trial Practice Guide Update, 17.

III. CONCLUSION

Upon consideration of the Petition, Response, Reply, Surreply and the evidence of record, we determine that Petitioners (1) have proven by a preponderance of the evidence that claims 1–12 and 16–23 of the ’394 patent would have been obvious based on Wu and Chaffee, and (2) have proven by a preponderance of the evidence that claims 1–12 and 16–23 would have been obvious based on Wu and Goldsmith.³⁸ We do not address

³⁸ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding, 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application

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the alternative grounds of whether claims 1–12 and 16–23 would have been obvious based on Wu, Goldsmith, and Chaffee; or Wu and Parienti.

IV. ORDER

For the reasons above, it is:

ORDERED that Petitioners have proven by a preponderance of the evidence that claims 1–12 and 16–23 are unpatentable;

FURTHER ORDERED that, pursuant to 35 U.S.C. § 318(b), upon expiration of the time for appeal of this decision, or the termination of any such appeal, a certificate shall issue canceling claims 1–12 and 16–23;

FURTHER ORDERED that the parties shall file, within 10 days of entry of this Decision, a joint motion to seal this Decision, and shall provide, along with the joint motion, an exhibit with a proposed redacted public version of this Decision; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

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Paper 138
Date: September 25, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEX RECREATION CORPORATION and
BESTWAY (USA) INC.,
Petitioner,

v.

TEAM WORLDWIDE CORPORATION,
Patent Owner.

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Before BEVERLY M. BUNTING, JAMES J. MAYBERRY, and
ERIC C. JESCHKE, *Administrative Patent Judges*.

JESCHKE, *Administrative Patent Judge*.

NOTICE

Notice of Disposition of Sealed Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

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Intex Recreation Corporation and Bestway (USA) Inc. (collectively “Petitioner”)¹ challenges the patentability of claims 1–12 and 16–23 of U.S. Patent No. 7,246,394 B2 (Ex. 1101, “the ’394 patent”), which is assigned to Team Worldwide Corporation (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6.

On September 12, 2019, we issued a non-public version of a Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. Paper 132. For the reasons discussed in the Final Written Decision (a public version of which will issue in due course), we concluded that Petitioner has proven by a preponderance of the evidence that claims 1–3, 7–12, 16–18, 22, and 23 of the ’394 patent are unpatentable.

¹ Walmart Inc., Wal-Mart Stores Texas, LLC, Wal-Mart.com USA LLC, and Sam’s West, Inc. d/b/a Sam’s Club (“the Walmart Entities”) were originally named as petitioners (Pet. 1); however, this proceeding was terminated with respect to the Walmart Entities during trial. Paper 119.

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The following table summarizes the determinations in this proceeding.

References	Basis	Claims Challenged	Claims Shown Unpatentable	Claims Not Shown Unpatentable
Walker ² and Chaffee ³	§ 103	1–4, 6–12, 16–19, and 21–23	1–3, 7–12, 16–18, 22, and 23	4, 6, 19, and 21
Walker and Goldsmith ⁴	§ 103	1–4, 6–12, 16–19, and 21–23	1–3, 7–12, 16–18, 22, and 23	4, 6, 19, and 21
Walker and Parienti ⁵	§ 103	1–4, 6–12, 16–19, and 21–23	Not reached	4, 6, 19, and 21
Walker; one of Chaffee, Goldsmith, or Parienti; and Basic Pneumatics ^{6,7}	§ 103	4–6 and 19–21	None	4, 6, 19, and 21
Overall Outcome		1–12 and 16–23	1–3, 7–12, 16–18, 22, and 23	4, 6, 19, and 21

² US 4,890,344, issued January 2, 1990 (Ex. 1110, “Walker”).

³ US 7,039,972 B2, issued May 9, 2006 (Ex. 1106, “Chaffee”).

⁴ US 2,493,067, issued January 3, 1950 (Ex. 1107, “Goldsmith”).

⁵ US 6,018,960, issued February 1, 2000 (Ex. 1108, “Parienti”).

⁶ SMC Pneumatics, Inc., *Basic Pneumatics* (Part # SMCT-P1-TX) (Ex. 1111, “Basic Pneumatics”).

⁷ We interpret this as three alternative grounds: (1) Walker, Chaffee, and Basic Pneumatics; (2) Walker, Goldsmith, and Basic Pneumatics; and (3) Walker, Parienti, and Basic Pneumatics. *See* Paper 1, at 22, 81–97.

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Paper 132
Entered: September 12, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEX RECREATION CORPORATION and
BESTWAY (USA) INC., Petitioners,

v.

TEAM WORLDWIDE CORPORATION,
Patent Owner.

Case IPR2018-00871
Patent 7,246,394 B2

Before BEVERLY M. BUNTING, JAMES J. MAYBERRY, and
ERIC C. JESCHKE, *Administrative Patent Judges*.

JESCHKE, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

ORDER
Denying Petitioners' Motion to Exclude
Denying Patent Owner's Motion to Exclude
37 C.F.R. § 42.64

APPX000140

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Intex Recreation Corporation and Bestway (USA) Inc. (“Petitioners”)¹ challenge the patentability of claims 1–12 and 16–23 (“the Challenged Claims”) of U.S. Patent No. 7,246,394 B2 (Ex. 1101, “the ’394 patent”), which is assigned to Team Worldwide Corporation (“Patent Owner”).

We have jurisdiction under 35 U.S.C. § 6, and we issue this Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons below, we conclude that Petitioners have proven by a preponderance of the evidence that claims 1–3, 7–12, 16–18, 22, and 23 of the ’394 patent are unpatentable, and we conclude that Petitioners have not established by a preponderance of the evidence that claims 4–6 and 19–21 are unpatentable.

I. BACKGROUND

A. PROCEDURAL HISTORY

Petitioners filed a Petition seeking *inter partes* review of the Challenged Claims. Paper 1 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 8. We instituted a trial as to all the Challenged Claims. Paper 14 (“Institution Decision” or “Inst. Dec.”).

During the trial, Patent Owner filed a Response (Paper 50, “PO Resp.”), Petitioners filed a Reply (Paper 76, “Pet. Reply”), and Patent Owner filed a Surreply (Paper 89, “PO Surreply”).² Petitioners and Patent Owner also filed Motions to Exclude Evidence (Papers 93, 95, respectively),

¹ Walmart Inc., Wal-Mart Stores Texas, LLC, Wal-Mart.com USA LLC, and Sam’s West, Inc. d/b/a Sam’s Club (“the Walmart Entities”) were originally named as petitioners (Pet. 1); however, this proceeding was terminated with respect to the Walmart Entities during trial. Paper 119.

² Paper 51 is a public version of the Patent Owner Response. Paper 77 is a public version of the Petitioners’ Reply. Paper 88 is a public version of the Patent Owner Surreply.

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Oppositions to the motions (Papers 99, 98, respectively), and Replies to the oppositions (Papers 101, 102, respectively).

Petitioners rely on the declaration testimony of Dr. Joseph J. Beaman, Jr. (Exs. 1102 & 1625) and Mr. W. Todd Schoettelkotte (Ex. 1649). Patent Owner relies on the declaration testimony of Dr. Glen Stevick (Ex. 2129) and Dr. Stephen L. Becker (Ex. 2638).

Oral argument was held on June 7, 2019, and a copy of the transcript of that argument was entered into the record. Paper 121 (public); Paper 122 (confidential) (“Tr.”).³

B. RELATED PROCEEDINGS

The parties identify a prior proceeding in the U.S. District Court for the Eastern District of Texas (“the Texas District Court”) involving the ’394 patent: *Team Worldwide Corp. v. Walmart Inc. et al.*, No. 2:17-cv-00235-JRG (E.D. Tex.), filed March 29, 2017 (“the Texas Litigation”). Pet. 1–2; PO Resp. 2 n.1; Paper 108, 1; Paper 115, 1–2. The Texas District Court issued a claim construction order on March 15, 2018. *See* Ex. 1167. On November 20, 2018, the Texas District Court dismissed the Texas Litigation with prejudice. *See* Ex. 1680.

The Texas Litigation also involved U.S. Patent No. 9,211,018 B2 (“the ’018 patent”) and U.S. Patent No. 7,346,950 B2 (“the ’950 patent”). Pet. 2; PO Resp. 2 n.1. Petitioners filed four additional petitions for *inter partes* review of claims 1–12 and 16–23 of the ’394 patent in IPR2018-

³ Public and confidential versions of the transcript in IPR2018-00875 was also entered into the record of this proceeding. *See* Paper 124 (public); Paper 125 (confidential). We do not cite to those transcripts in this Decision.

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00870, IPR2018-00872, IPR2018-00873, and IPR2018-00874. Petitioners also filed petitions for *inter partes* review of (1) claims 1, 5, 7, and 11–14 of the '018 patent, in IPR2018-00859, and (2) claims 1, 7, and 11–14 of the '950 patent, in IPR2018-00875.

The parties also identify the following proceedings in the Texas District Court involving the '394 patent, the '018 patent, and the '950 patent:

- (1) *Team Worldwide Corp. v. Macy's, Inc. and Macys.com, LLC*, No. 2:19-cv-00099-JRG (E.D. Tex.);
- (2) *Team Worldwide Corp. v. Target Corp. and Target Brands, Inc.*, No. 2:19-cv-00100-JRG (E.D. Tex.);
- (3) *Team Worldwide Corp. v. The Home Depot, Inc.*, No. 2:19-cv-00098-JRG (E.D. Tex.);
- (4) *Team Worldwide Corp. v. Dick's Sporting Goods, Inc.*, No. 2:19-cv-00097-JRG (E.D. Tex.);
- (5) *Team Worldwide Corp. v. Costco Wholesale Corp.*, No. 2:19-cv-00096-JRG (E.D. Tex.);
- (6) *Team Worldwide Corp. v. Bed Bath & Beyond, Inc.*, No. 2:19-cv-00095-JRG (E.D. Tex.);
- (7) *Team Worldwide Corp. v. Amazon.com, Inc. and Amazon.com LLC*, No. 2:19-cv-00094-JRG (E.D. Tex.);
- (8) *Team Worldwide Corp. v. Ace Hardware Corp.*, No. 2:19-cv-00093-JRG (E.D. Tex.); and
- (9) *Team Worldwide Corp. v. Academy, Ltd. d/b/a Academy Sports + Outdoors*, No. 2:19-cv-00092-JRG (E.D. Tex.).

Paper 108, 2–3; Paper 115, 3–4. According to Patent Owner, these nine proceedings are stayed pending the outcomes of IPR2018-00859 and IPR2018-00870 through -00875. Paper 108, 3.

Patent Owner states it has “filed a claim in *In re Sears Holding Corporation, et al.* chapter 11 bankruptcy cases pending before the United States Bankruptcy Court for the Southern District of New York, Case No. 18-23538 (RDD) (Jointly Administered) in which Patent Owner asserts

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infringement” of the ’394 patent, the ’018 patent, and the ’950 patent.

Paper 108, 3.

C. THE ’394 PATENT

The ’394 patent, titled “Inflatable Product with Built-in Housing and Switching Pipe,” issued on July 24, 2007. Ex. 1101, at codes (54), (45). It “relates in general to an inflatable product provided with an electric air pump.” *Id.* at 1:14–15. According to the ’394 patent, prior air mattresses included inflatable chambers that “are inflated by an electric air pump . . . , which is separately provided, requiring users to carry two items, the air mattress itself, and an electric air pump” such that “[i]nconvenience results, especially for outdoor use.” *Id.* at 1:17–24. The ’394 patent, in contrast, “provides a modified air mattress, which has a built-in electric air pump eliminating the need for an external pump.” *Id.* at 1:25–27. Figure 1A is reproduced below:

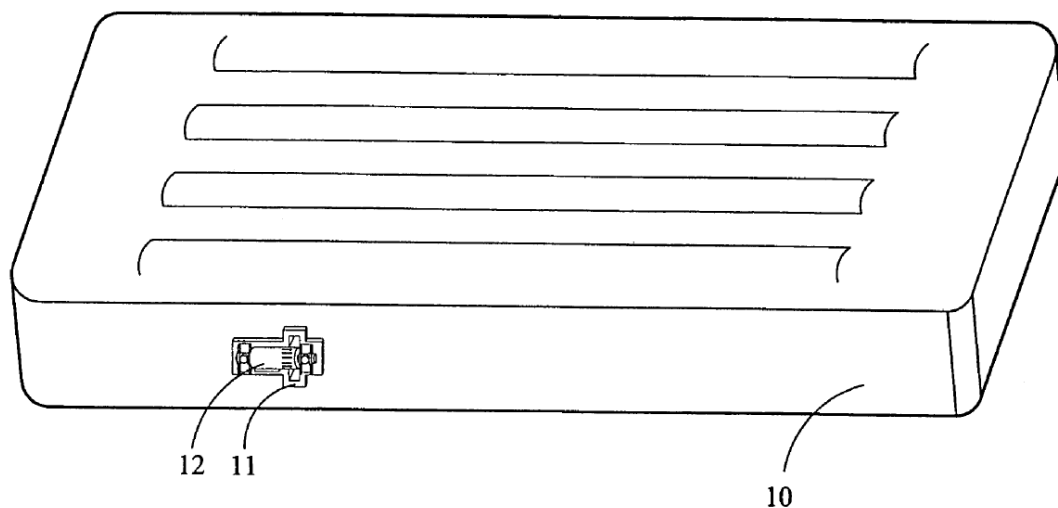


FIG. 1A

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Figure 1A depicts “a perspective diagram of an inflatable product,” which includes inflatable chamber 10, pump seat 11, and air pump 12. *Id.* at 1:50–51, 3:15–21. Figures 3A and 3B are reproduced below:

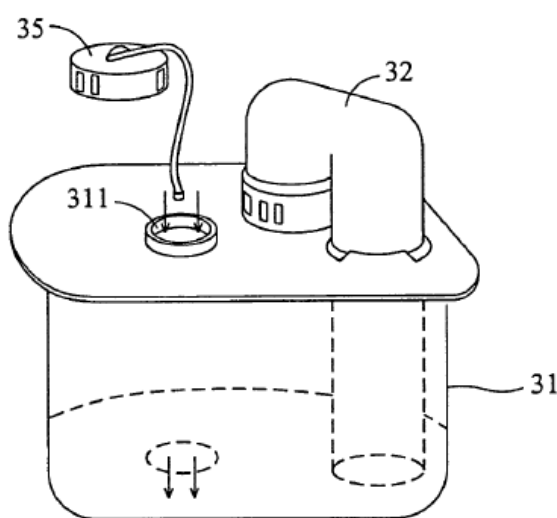
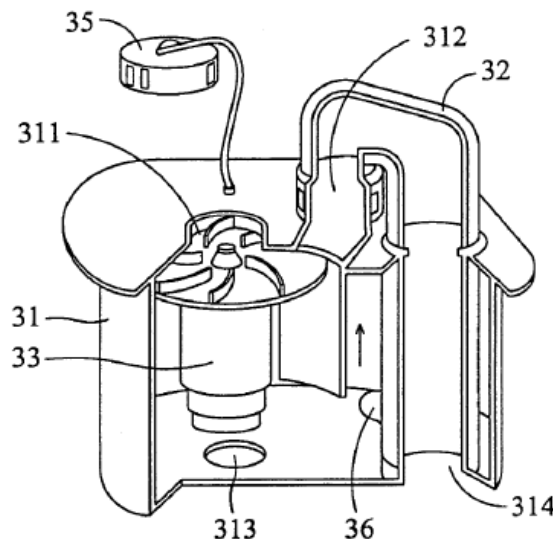
**FIG. 3A****FIG. 3B**

Figure 3A depicts an air pump of an embodiment of an inflatable product (as shown, for example, in Figure 1A) during inflation. *See id.* at 1:66–67. Figure 3B depicts the air pump of Figure 3A with portions of certain structures removed. *See id.* at 2:1–2. Figures 3A and 3B show, among other aspects, housing 31, fan and motor 33, switching pipe 32, flap 36, and cover 35. *Id.* at 4:13–16. For inflation, “the switching pipe 32 is connected to the air outlet 312 on the top surface of the housing 31” and “cover 35 is removed from the air intake 311.” *Id.* at 4:22–25.⁴ In this configuration, “[t]he inflatable product (not shown) is inflated by the fan and motor 33” as “[a]ir flows through the air intake 311 and the air outlet 313, and into the inflatable product.” *Id.* at 4:25–28.

⁴ Throughout this Decision, we omit any bolding of reference numerals in quotations from the ’394 patent and from prior art references.

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Figures 3C and 3D are reproduced below:

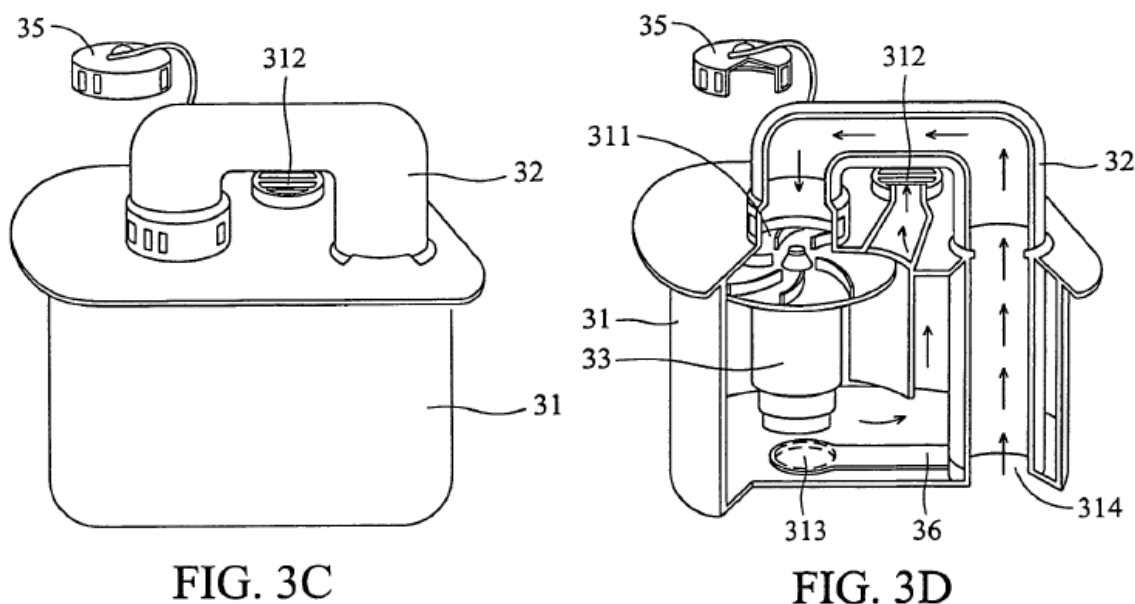
**FIG. 3C****FIG. 3D**

Figure 3C depicts an air pump of an embodiment of an inflatable product during deflation. *See* Ex. 1101, 2:3–4. Figure 3D depicts the air pump of Figure 3C with portions of certain structures removed. *See id.* at 2:5–6. For deflation, “the switching pipe 32 is switched from the air outlet 312 to the air intake 311 on the top surface of the housing 31” and “the flap 36 follows the switching pipe 32 to rotate to close the air outlet 313 on the bottom surface of the housing 31.” *Id.* at 4:29–33. In this configuration, “air in the inflatable product is evacuated by the fan and motor 33” along the path indicated by arrows such that “[a]ir flows through the air intake 314, the switching pipe 32 and the air intake 311, and into the housing 31” and “out from the air outlet 312.” *Id.* at 4:33–38.

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D. ILLUSTRATIVE CLAIM

Of the Challenged Claims, claims 1 and 16 are independent. Claims 2–12 depend from claim 1, and claims 17–23 depend from claim 16.

Claim 1 is reproduced below:

1. An inflatable product including:
 - an inflatable body;
 - a fan and motor assembly for pumping air;
 - a housing built into the inflatable body, the housing having an interior region; and
 - an air conduit disposed at least in part in the housing, the air conduit being movable between a first position and a second position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;
- wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.

Ex. 1101, 8:24–38.

Claim 16 is reproduced below:

16. An inflatable product including:
 - an inflatable body;
 - a fan and motor assembly for pumping air;
 - a housing built into the inflatable body, the housing having an interior region; and
 - an air conduit having a first end and a second end, the air conduit disposed at least in part in the housing and arranged to convey air pumped by the fan and motor assembly, the air conduit being

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movable between a first position and a second position, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;

wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation, and

wherein the fan and motor assembly causes air to be conveyed from the first end of the air conduit to the second end of the air conduit when the air conduit is in the first position, and the fan and motor assembly causes air to be conveyed in sequence from the inflatable body, through the second end of the air conduit, to the first end of the air conduit, to ambient when the air conduit is in the second position.

Ex. 1101, 9:38–10:19.

E. INSTITUTED GROUNDS OF UNPATENTABILITY

We instituted *inter partes* review of the Challenged Claims based on the following grounds of unpatentability asserted by Petitioners:

References	Basis	Claims Challenged
Walker ⁵ and Chaffee ⁶	§ 103	1–4, 6–12, 16–19, and 21–23
Walker and Goldsmith ⁷	§ 103	1–4, 6–12, 16–19, and 21–23
Walker and Parienti ⁸	§ 103	1–4, 6–12, 16–19, and 21–23

⁵ US 4,890,344, issued January 2, 1990 (Ex. 1110, “Walker”).

⁶ US 7,039,972 B2, issued May 2006 (Ex. 1106, “Chaffee”).

⁷ US 2,493,067, issued January 3, 1950 (Ex. 1107, “Goldsmith”).

⁸ US 6,018,960, issued February 1, 2000 (Ex. 1008, “Parienti”).

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References	Basis	Claims Challenged
Walker; one of Chaffee, Goldsmith, or Parienti; and Basic Pneumatics ^{9,10}	§ 103	4–6 and 19–21

II. DISCUSSION**A. THE LEVEL OF ORDINARY SKILL IN THE ART**

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). In the Institution Decision, we adopted Patent Owner’s formulation of the level of ordinary skill in the art: one of ordinary skill in the art would have had either (1) a bachelor’s degree in mechanical engineering or an equivalent field or (2) at least two years of experience in mechanical and electrical design aspects of inflatable products having electric air pumps. Inst. Dec. 15–16.

Following institution, neither Petitioners nor Patent Owner objected to this determination. *See* PO Resp. 14 (repeating the same formulation as stated prior to institution); *see also* Inst. Dec. 15 n.8 (discussing why we did not discern any special meaning for the term “designer” in Patent Owner’s formulation of the level of skill in the art for an individual without a bachelor’s degree in mechanical engineering). For the same reasons provided in the Institution Decision (*id.* at 14–16), we maintain this

⁹ SMC Pneumatics, Inc., *Basic Pneumatics* (Part # SMCT-P1-TX) (Ex. 1111, “Basic Pneumatics”).

¹⁰ We interpret this as three alternative grounds: (1) Walker, Chaffee, and Basic Pneumatics; (2) Walker, Goldsmith, and Basic Pneumatics; and (3) Walker, Parienti, and Basic Pneumatics. *See* Pet. 22, 81–97.

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determination of the level of ordinary skill in the art for purposes of this Final Written Decision. Further, the patentability and claim construction analyses below would reach the same findings and determinations under either party's definition of the level of ordinary skill in the art.

B. CLAIM CONSTRUCTION

In an *inter partes* review based on a petition filed prior to November 13, 2018, claim terms in an unexpired patent, such as the '394 patent, are given their broadest reasonable construction in light of the specification.¹¹ See 37 C.F.R. § 42.100(b) (2017); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard as the claim construction standard to be applied in an *inter partes* review proceeding); see also Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018). Under the broadest reasonable construction standard, claim terms are generally given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

¹¹ Patent Owner's contentions regarding the applicability of the district-court-type claim construction standard are inapposite because the present Petition was filed prior to the rule change effective November 13, 2018. See PO Resp. 6, 6 n.3. Although the applicable version of Rule 42.100(b) permitted a party to request that the Board apply the district-court-type claim construction standard, Patent Owner did not provide either the required certification or the required request. See 37 C.F.R. § 42.100(b).

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Petitioners propose constructions for the terms “pipe” (Pet. 23–25), “inflatable body” (*id.* at 25–27), and “fan” (*id.* at 27–28). Patent Owner proposes constructions for the terms “built into” (PO Resp. 7–8), “inflatable body” (*id.* at 8–11), “pipe” (*id.* at 12), “switching pipe” (*id.* at 12–13), and “fan” (*id.* at 13–14). We determined in our Institution Decision that express construction of the terms “inflatable body,” “built into,” and “pipe” was necessary. Inst. Dec. 16–27. Based on the full record developed at trial, we maintain that view for purposes of this Final Written Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (stating that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). We discuss those three terms below.

1. “inflatable body”

Claims 1–3, 9, 11, 16–18, and 22 each recite an “inflatable body.” Petitioners argue that the broadest reasonable interpretation of “inflatable body” is “a structure that expands when filled with air or other gases.” Pet. 25 (citing Ex. 1102 ¶¶ 147–162). Patent Owner proposes to construe “inflatable body” in line with the Texas District Court as “a *substantially airtight* structure that expands when filled with air or other gases.” PO Resp. 8–9, 11; Ex. 1167, 14 (construing “inflatable body” in both the ’394 patent and the ’018 patent).

The only difference between the two proposed constructions is that Patent Owner (as did the Texas District Court) includes a “substantially airtight” requirement. In the Institution Decision, we preliminarily construed “inflatable body” as proposed by Petitioners: “a structure that

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expands when filled with air or other gases.” *See* Inst. Dec. 21. In light of the complete record as developed at trial, and for the reasons below, we maintain this construction of “inflatable body.”

We start with the language of the claims. *TQ Delta, LLC v. DISH Network LLC*, 929 F.3d 1350, 1357 (Fed. Cir. 2019). As noted by Petitioners, the claims do not include an *express* requirement that the “inflatable body” is substantially airtight. *See* Pet. 26 (“No intrinsic evidence requires the inflatable body to be ‘substantially airtight.’”) (citing Ex. 1101, claims 1–3, 9, 11, 13, 14, 16–18, 22, Abstract, 3:17, Figs. 1A, 4A; Ex. 1153; Ex. 1102 ¶¶ 150–153). Neither the claim language at issue nor any other language from the claims requires the “inflatable body” to be substantially airtight.

We turn now to the Specification, which uses “inflation” to describe the process of filling a structure with air and uses “inflatable” to describe a structure *capable of* such a process, for example inflatable chamber 10. *See, e.g.*, Ex. 1101, 3:32–37, 4:22–28. We view these aspects of the Specification as aligning with and supporting the requirement—common to *both* proposed constructions and the Texas District Court’s construction—that the structure “expands when filled with air or other gases.” *See* PO Resp. 8–9; Ex. 1167, 14; Pet. 25.

Referring to Figure 1A of the ’394 patent (*see supra* p. 5), Petitioners contend that without pump structures 11 and 12, inflatable chamber 10 (i.e., the “inflatable body”) would have “a gaping hole at the location where the pump assemblies are built into the inflatable bodies.” Pet. 26 (citing Ex. 1101, 3:17, Figs. 1A, 4A; Ex. 1102 ¶ 152). Relying on the testimony of Dr. Beaman, Petitioners contend that “without those pump assemblies

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(which are not inflatable), the inflatable body itself would not even inflate, let alone be ‘substantially airtight.’” *Id.* (citing Ex. 1101, 3:17, Figs. 1A, 4A; Ex. 1102 ¶ 152).

Patent Owner responds that this argument “ignores the actual structure of the ‘394 patent that makes the overall structure with the built-in pump airtight.” PO Resp. 9. Patent Owner notes that claim 1 recites a “housing ***built into*** the inflatable body” and argues that “[t]he mattress in the ‘394 patent is airtight and the ‘hole’ is only introduced to build the pump into it, so the overall structure remains substantially airtight.” *Id.* Patent Owner argues that the Specification refers to the “present invention” as an “air mattress” and that “[t]hroughout the specification, the terms ‘inflatable body’ and ‘housing built into’ read together as recited in claim 1 are consistent with the substantially airtight nature of an air mattress.” *Id.* at 9–10 (citing Ex. 1101, 1:34–35, 1:25–28, 1:30–33, 3:15–45, 4:39–62, 5:48–64, 6:10–16, Figs. 1A, 4A, 5A, 7A).

With this argument and its proposed construction, Patent Owner conflates the preamble term “inflatable *product*” with the claim term at issue—“inflatable *body*.” *See, e.g.*, PO Resp. 9 (arguing that the “overall structure” is “airtight”). Both independent claims 1 and 16, as well as the Specification, distinguish between an “inflatable product” and an “inflatable body.” *See* Ex. 1101, 8:24–25 (claim 1, reciting “[a]n inflatable product” in the preamble and “an inflatable body” in the body), 9:38–39 (claim 16, reciting “[a]n inflatable product” in the preamble and “an inflatable body” in the body), 4:39–43 (describing an “inflatable product” including mattress pad 41 into which pump assembly 43 is built), 5:48–51 (describing an “inflatable product” with two “inflatable chambers,” an air pump assembly,

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and a two-way valve), 7:20–27 (describing an “inflatable product” including an inflatable shank and air pump that supplies a shank with air).

Here, we agree with Patent Owner that the relevant “overall structure” (PO Resp. 9)—i.e., the “inflatable *product*” depicted in, for example, Figure 1A—could reasonably be said to be substantially airtight.¹² *See* Ex. 1101, 1:49–51 (describing Fig. 1A as a “perspective diagram of an inflatable product in accordance with a first embodiment of the present invention”); PO Resp. 10 (arguing that “every ‘394 patent embodiment is substantially airtight”); Tr. 58:1–3 (“Every embodiment of the 394 Patent is substantially airtight. It is intended to inflate, keep the air in, and then deflate, that’s the whole point of it; otherwise nobody would use them.”). That is, pump structures 11, 12, and covers 14, 14’ work in concert to ensure that air does not leak from the opening in inflatable chamber 10 at holes 111, 112. *See* Ex. 1101, 3:15–45.

In contrast, inflatable chamber 10, *by itself*—which corresponds with the recited “inflatable body”—need *not* necessarily be substantially airtight, as these additional structures (discussed above) would not be present to retain substantially all air added to chamber 10. *See id.* at 3:21–23 (describing holes 111, 112 through which air passes into inflatable chamber 10); *see also id.* at Fig. 4F (depicting valve 436’ as sealing the air passage to mattress pad 41 through air outlet 4302’), 7:27–65 (describing the operation of check valves to control the flow of air into and out of shank 92); Tr. 11:19–12:2 (discussing how a party balloon could be an “inflatable

¹² Patent Owner does not argue that the preambles to independent claim 1 or claim 16 are limitations and does not argue that Walker fails to satisfy the preambles. *See infra* note 15.

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body” under Petitioners’ construction even with a hole in it for inflation and how *other structures* could make the overall system substantially airtight).

To Patent Owner, an “inflatable body” must not only “fill[]” when “[y]ou add air to it” (Tr. 56:2)—as essentially required by our preliminary construction—but, *in addition*, an “inflatable body” must, if “you stop adding air,” “retain[] that air until you deflate it” (*id.* at 56:2–3)—i.e., the substantially airtight requirement. Although we agree with Patent Owner to the extent that an “inflatable body” must retain air *sufficiently* such that it “expands when filled with air or other gases” as required by our construction, for the reasons above, we do not agree that this means that the “inflatable body” must be “airtight” or even “substantially airtight.” Tr. 52:9–14 (“To summarize [Patent Owner’s] position on inflatable body, it is the inflatable body of the inflatable product *is an airtight chamber*, bladder, and the fact that you cut a hole in it, but then plug the hole is the whole point of this, is that *it remains airtight in usage*, and we think that the semantic argument that’s not a real-world argument about how the term is used in the 394 Patent.” (emphasis added)).

The distinction between the “inflatable body” and the “inflatable product” also provides context for two statements by Petitioners’ expert, Dr. Beaman, highlighted by Patent Owner (PO Resp. 9): (1) that one of ordinary skill in the art “would have generally understood *an air mattress* to be a substantially airtight structure” (Ex. 1102 ¶ 186 (emphasis added)) and (2) that the “invention” of the ’394 patent is substantially airtight (PO Resp. 9 (citing Ex. 2040, 94–95)). We view these statements as supporting Petitioners’ position that the product as a whole (i.e., the recited “inflatable product”) would be substantially airtight, but not necessarily supporting

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Patent Owner’s position that the recited “inflatable body” is not necessarily substantially airtight by itself. *See, e.g.*, Ex. 2040, 95:9–14 (“Q. All of the invention of the ’394 patent is about putting out an air mattress that is actually substantially airtight when it’s filled, right, that’s the goal? . . . A. *Of the entire product, yes.*” (emphasis added)). That the “inflatable product” recited in the preamble may, *as a whole*, be substantially airtight does not necessarily mean that the “inflatable body” at issue—i.e., a *component* of the “inflatable product”—must, *on its own*, be substantially airtight.¹³

For these reasons, we do not view the Specification as supporting Patent Owner’s position that, under the broadest reasonable construction, the recited “inflatable body” must be “substantially airtight.”

Second, we turn to the prosecution history and the related issue of the constructions of “inflatable body” by two district courts. Patent Owner asserts to have “contemporaneously defined the term ‘inflatable body’ as being ‘substantially airtight’” based on a statement made during prosecution of the ’018 patent—i.e., a patent *other than* the ’394 patent at issue in this proceeding. PO Resp. 10 (citing Ex. 2104, 3–4). According to Patent Owner,

The ’018 Patent is probative to the construction of ‘inflatable body’ of the ’394 patent in part because both cover inventions by the same sole inventor, both include an identical Field of

¹³ Solely by way of analogy, a customary party balloon (with a large hole for inflation) would likely be “a structure that expands when filled with air or other gases,” but would not *alone* be substantially airtight under Patent Owner’s understanding. *See* Tr. 11:19–12:2 (counsel for Petitioners discussing this analogy when addressing their proposed construction for “inflatable body”). Adding another component to the party balloon to close the hole, however, could result in an *overall structure* that is substantially airtight. *Id.*

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Invention, both use many of the same terms (including ‘inflatable body’ in the claims), and both issued from co-pending families which cover mutually relevant subject matter.

Id. at 11. Patent Owner contends that “[t]wo district courts in two separate cases involving Petitioners and Patent Owner have construed ‘inflatable body’ as including a ‘substantially airtight’ requirement.” *Id.* According to Petitioners, the Texas District Court’s construction, which included the “substantially airtight” requirement was “erroneous, as it relied on the prosecution history of an unrelated patent [i.e., the ’018 patent] as intrinsic evidence.” Pet. 26 (citing Ex. 1167, 9–14).

As noted above, the Texas District Court, in a single *Markman* order, construed “inflatable body” in *both* the ’394 patent and the ’018 patent as a “substantially airtight structure that expands when filled with air or other gases.” Ex. 1167, 14. The Texas District Court stated that “‘inflatable body’ was defined during prosecution, [and] that definition governs,” but then went on to discuss *only* the prosecution history of the ’018 patent—not the ’394 patent. *Id.* at 12–13. Although we acknowledge the considerable experience of the Texas District Court in patent-related matters, having now considered the related application data of the ’394 patent and the ’018 patent, we continue to agree with Petitioners in finding that these two patents are not sufficiently related such that statements in the prosecution history of the ’018 patent would effectively define the common term “inflatable body” in the ’394 patent. *Compare* Ex. 1101, (62), *with* Ex. 2105, (60) (showing no common related applications between the ’394 patent and the ’018 patent); *see* Inst. Dec. 20–21.

We reach this determination even assuming the correctness of Patent Owner’s view that the ’018 patent and the ’394 patent “both cover

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inventions by the same sole inventor, both include an identical Field of Invention, both use many of the same terms (including ‘inflatable body’ in the claims), and both issued from co-pending families which cover mutually relevant subject matter.” PO Resp. 11; *see Abbott Labs. v. Dey, L.P.*, 287 F.3d 1097, 1100, 1104–05 (Fed. Cir. 2002) (determining that the relationship between two patents was “insufficient to render particular arguments made during prosecution of [one of the patents] equally applicable to the claims of [the other patent]” despite “common subject matter, a common inventor, and the same assignee”); *see also Pfizer, Inc. v. Ranbaxy Labs. Ltd.*, 457 F.3d 1284, 1290 (Fed. Cir. 2006) (“[S]tatements made during prosecution of [a] later, unrelated . . . patent cannot be used to interpret claims of [another] patent.”).

The United States District Court for the District of Columbia likewise construed “inflatable body” in the context of U.S. Patent No. 6,793,469 (Ex. 1614, “the ’469 patent”) in the same manner as proposed by Patent Owner. *See* Ex. 2103, 2, 14–15. Even assuming, as asserted by Patent Owner, that the ’469 patent “ha[s] the same specification as the ’018 Patent” (PO Resp. 11), for similar reasons to those discussed above, we do not view the D.C. District Court’s construction in the context of the ’469 patent as indicating that the common term “inflatable body” in the ’394 patent should include a “substantially airtight” requirement. *Compare* Ex. 1101, (62), *with* the ’469 patent, (63) (showing no common related applications between the ’394 patent and the ’469 patent); *see Abbott*, 287 F.3d at 1100, 1104–05.¹⁴

¹⁴ Moreover, even if the ’018 patent or the ’469 patent were viewed as sufficiently related to the ’394 patent, based on the different claim

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Third, this understanding of “inflatable body” (i.e., as not including a “substantially airtight” requirement) is also supported by certain extrinsic evidence, such as the dictionary definitions provided by Petitioners. *See* Ex. 1159, 3 (defining “inflated” as “[f]illed or distended with air or gas”); Ex. 1160, 3 (defining “inflatable” as “able to be blown up or filled with air or gas”); *see also* Pet. 26 (discussing extrinsic evidence). And, these definitions align with the Specification’s usage of “inflation” and “inflatable,” as discussed above. *See supra* p. 13.

Based on the complete record and for the reason discussed, we maintain our construction of “inflatable body” from the Institution Decision: a “structure that expands when filled with air or other gases.”

2. “*built into*”

Independent claims 1 and 16 each recite “a housing *built into* the inflatable body.” Ex. 1101, 8:27, 9:41 (emphasis added). In the Institution Decision, we preliminarily construed “built into” in accordance with its plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” Inst. Dec. 24.

Patent Owner agrees with this construction. *See* PO Resp. 8 (stating that “‘built into’ should be construed as ‘integrated into and not detachable from’”), 7 (stating that the preliminary construction “agrees with Patent Owner’s proposed definition”). Petitioners did not address this claim term in the claim construction section of the Petition or in the Reply. *See* Pet. 23–28; *see generally* Pet. Reply. Here, the parties agree on the construction of

construction standards in *inter partes* review and district courts, “the board is not generally bound by a prior judicial construction of a claim term.” *See Power Integrations, Inc. v. Lee*, 797 F.3d 1318, 1326 (Fed. Cir. 2015).

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“built into,” but do not agree on the application of that construction to the asserted prior art. *See* Tr. 13:13–14 (counsel for Petitioners stating that the parties “have a disagreement on what th[e] terms [in the construction] mean in their application”), 49:24–50:1 (counsel for Patent Owner stating that “both sides, and the Board, have all agreed that the definition that should be used is integrated into and not detachable from”). We address the disagreements as to the *application* of this construction to the prior art in the discussion of the particular asserted grounds.

Based on the complete record, for the reasons provided in the Institution Decision, we maintain our construction of “built into” in accordance with its plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” *See* Inst. Dec. 21–24.

3. “pipe”

Dependent claims 4–6 and 19–21 each recite the term “pipe.” Ex. 1101, 8:47–52, 10:27–32. In the Institution Decision, we preliminarily construe the term “pipe” as “a tubular or cylindrical object, part, or passage.” Inst. Dec. 27. Patent Owner agrees with this construction. *See* PO Resp. 12 (stating that “pipe” “should be given its plain and ordinary meaning of ‘a tubular or cylindrical object, part, or passage’ as found by the district court” (citing Ex. 1167, 14–16)).

Although Petitioners originally proposed to construe “pipe” as “a hollow body for conveying air or other gases” (Pet. 23), Petitioners *now* take the position that “[t]he parties agree with the Board’s preliminary construction of ‘pipe’” (Pet. Reply 10). *See* PO Surreply 8 (“The parties and

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the Board have agreed that ‘pipe’ should be construed as ‘a tubular or cylindrical object, part, or passage.’”).

The parties agree on the construction of “pipe,” but do not agree on the application of that construction to the asserted prior art. *See* Tr. 15:6–9 (counsel for Petitioners stating that “the parties agree that the meaning of pipe is a tubular or cylindrical object part or passage” but that “[o]nce again there is a disagreement as far as application”); Pet. Reply 10 (arguing that Patent Owner’s “arguments regarding Walker’s gate 338 . . . depart from this agreed construction by attempting to inject a non-specific length requirement to the term ‘pipe,’ which the Board should reject”); PO Surreply 8 (“Despite the lack of an explicit length requirement in the construction, [one of ordinary skill in the art] would not see an opening in a plane one micrometer thick and recognize the plane as being tubular or cylindrical.”). We address the disagreements as to the *application* of this construction to the prior art in the discussion of the particular asserted grounds.

Based on the complete record, for the reasons provided in the Institution Decision, we maintain our construction of “pipe” as “a tubular or cylindrical object, part, or passage.” *See* Inst. Dec. 24–27.

4. Other Claim Language

Based on the full record developed at trial, the determination as to the alleged obviousness of the Challenged Claims does not turn on the express interpretation of any of the remaining claim terms. Thus, we need not construe explicitly any other claim terms in the context of this proceeding. *See Nidec*, 868 F.3d at 1017.

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**C. ASSERTED OBVIOUSNESS OF CLAIMS 1–4, 6–12, 16–19, AND 21–23
BASED ON WALKER AND CHAFFEE**

Petitioners assert that claims 1–4, 6–12, 16–19, and 21–23 of the '394 patent are unpatentable under 35 U.S.C. § 103(a) based on Walker and Chaffee. Pet. 22, 32–70; Pet. Reply 1–12. Patent Owner provides arguments specifically addressing this asserted ground. *See* PO Resp. 14–40; PO Surreply 1–10. We begin our analysis with an overview of the asserted prior art and then address the parties' specific contentions in turn.

1. Walker

Walker is generally directed to “air pumps and hand controls for supplying air under pressure to air mattresses and adjusting the pressure of the air in the air mattresses.” Ex. 1110, 1:20–23. The relied-upon embodiment relates to “an air mattress in association with a sofa sleeper” (*id.* at 11:14–17), indicated as 310 in Figure 17, reproduced below:

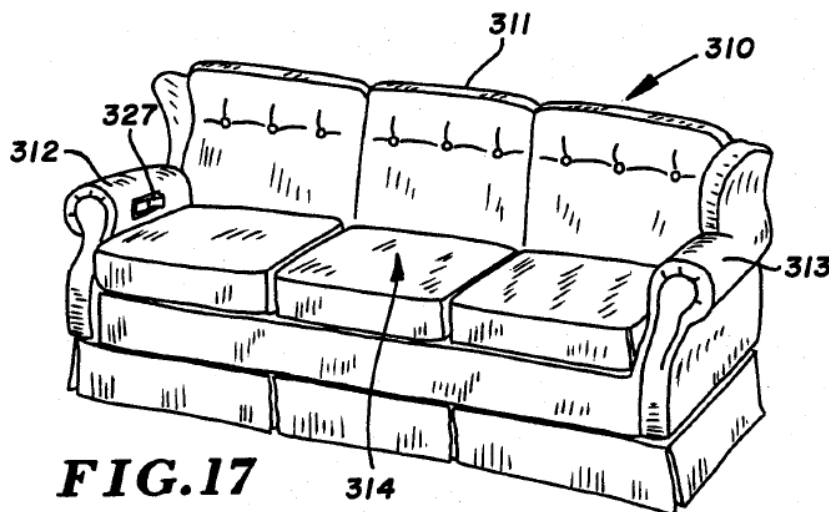


Figure 17 depicts a “perspective view of the sofa sleeper in the sitting or sofa position.” *Id.* at 4:9–10.

Figures 18 and 19 are reproduced below:

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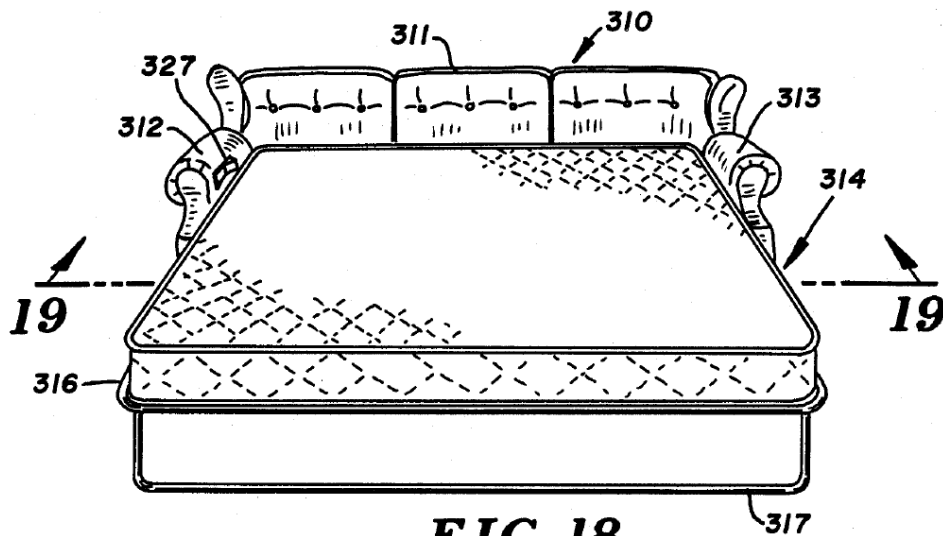
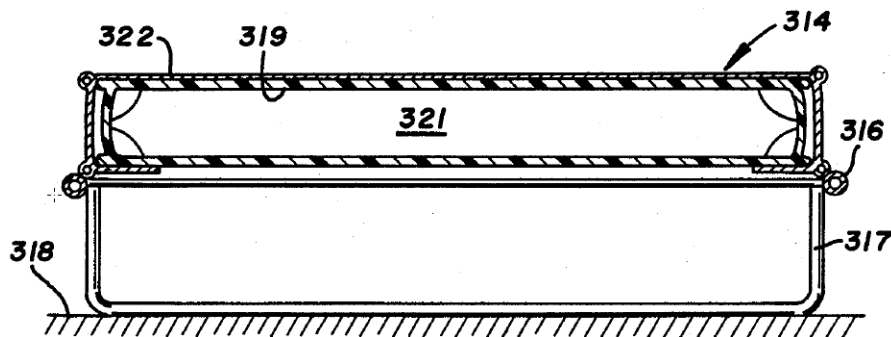
**FIG. 18****FIG. 19**

Figure 18 depicts “a perspective view of the sofa sleeper of [Figure 17] open to the bed position with the air mattress inflated” and Figure 19 depicts “an enlarged sectional view taken along the line 19—19” of Figure 18. *Id.* at 4:13–17. These figures include, among other aspects, air mattress 319, air chamber 321, folding frame 316, and support legs 317. *See id.* at 11:21–27.

Figure 20 of Walker is reproduced below:

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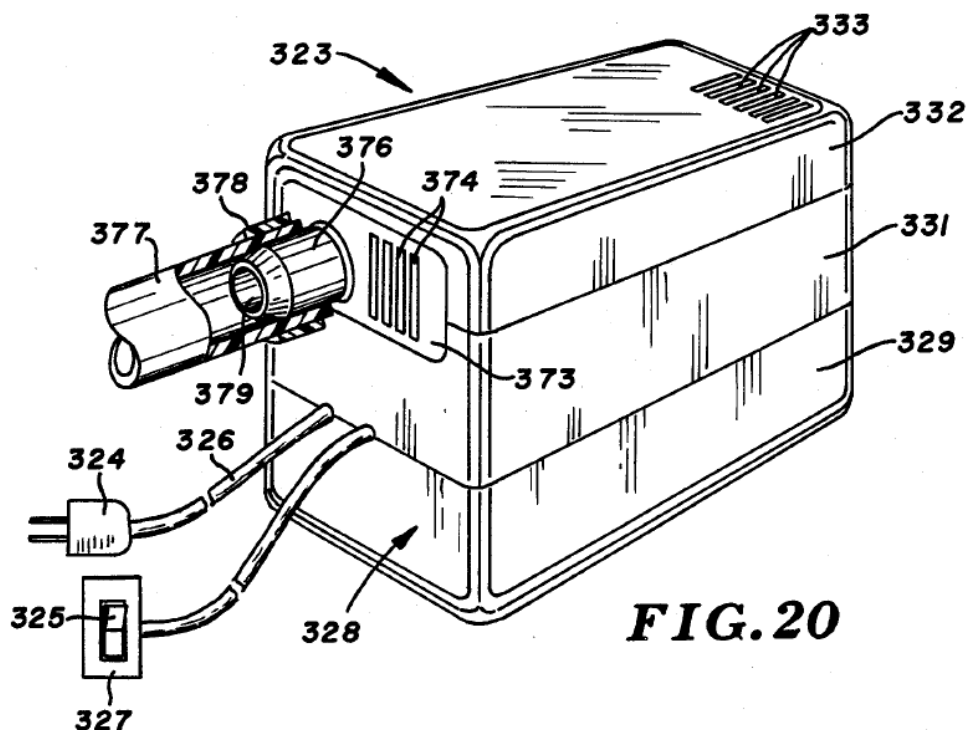


Figure 20 depicts an embodiment of an air pump and air control apparatus used in the sofa sleeper of Figure 17. *See id.* at 4:18–20, 11:32–35. Associated with air pump and control apparatus 323 in Figure 20 are, among other aspects, box-shaped casing 328, inlet air openings 333, outlet air opening 374, air hose 377 (which is connected to chamber 321 in Figure 19), and remote hand control 327. *See id.* at 11:32–38, 11:42–45, 11:48–49, 11:52–54, 12:50–53.

Figure 25 of Walker is reproduced below:

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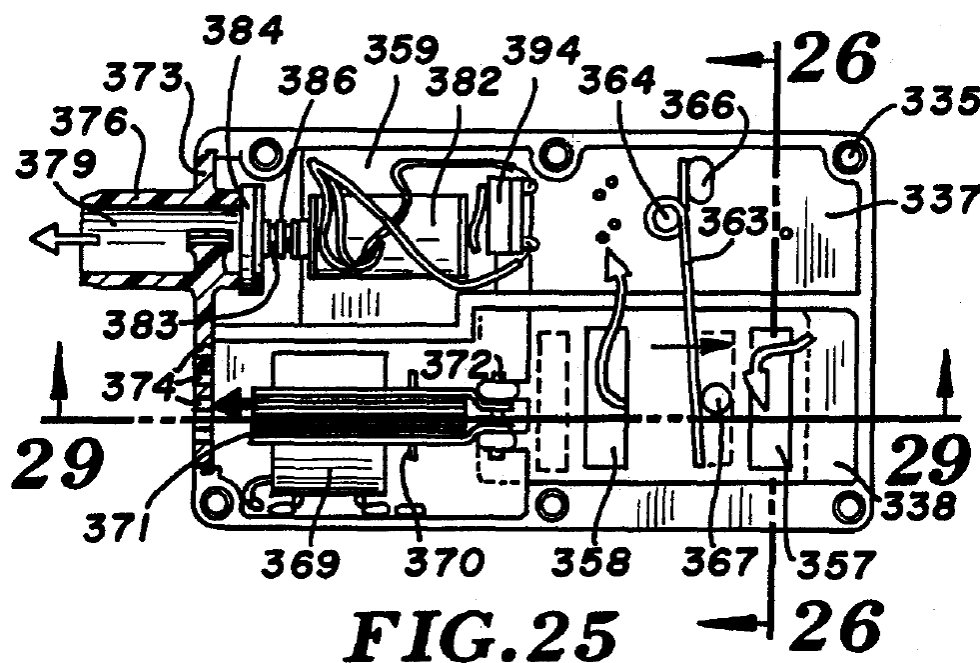


Figure 25 depicts a horizontal cross-sectional view of apparatus 323 (shown in Figure 20) at the height of air hose 377. *See* Ex. 1110, 4:18–22, 4:29–30. In this annotated version, Petitioners have overlaid gate 338 in orange. Walker discloses that gate 338 “is slidably mounted on wall 337 to control the flow of air through apparatus 323” and “is selectively movable between a first position, shown in full lines, and a second position, shown in broken lines, with respect to wall 337.” *Id.* at 12:22–27.

Walker discloses that, when gate 338 is in the first position, air is allowed to flow through chambers in apparatus 323 to inflate mattress 319 using hose 377. *See id.* at 12:30–33, 13:6–9; *see also id.* at Fig. 23 (showing electric motor 344 and impeller 348). Walker also discloses that, when gate 338 is in the second position, air is allowed to flow in the opposite direction to deflate mattress 319. *See id.* at 12:33–38, 13:9–12.

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2. Chaffee

Chaffee relates to “inflatable devices, and, more specifically, to an inflatable device with a recessed fluid controller.” Ex. 1106, 1:13–15.

Figure 2 of Chaffee is reproduced below:

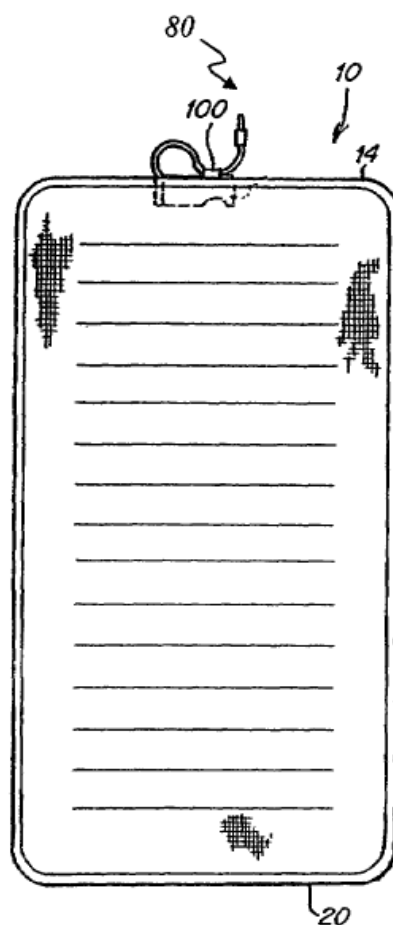


Fig. 2

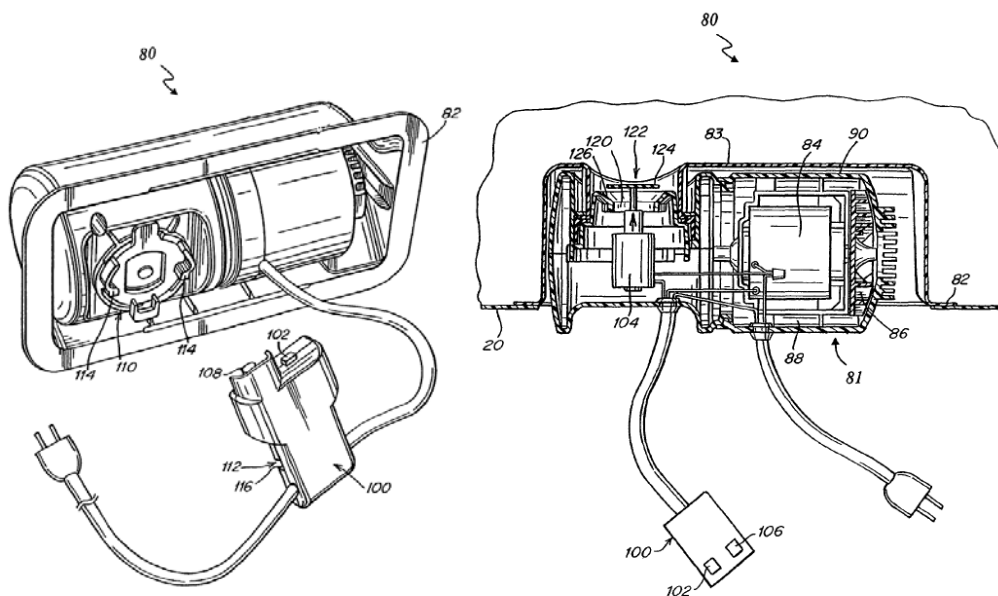
Figure 2 depicts inflatable device 10, which includes, among other aspects, “substantially fluid impermeable bladder 20 and a fluid controller 80 comprising an electrically powered pump at least partially positioned within bladder 20.” *Id.* at 3:3–7. Chaffee discloses that fluid controller 80 “control[s] the flow of fluid into and/or out of bladder 20.” *Id.* at 3:59–61.

Figures 3 and 5 are reproduced below:

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*Fig. 3**Fig. 5*

Figures 3 and 5 depict a perspective view and cross-sectional view, respectively, of one embodiment of fluid controller 80. *See id.* at 2:34–35, 38–39. These figures depict, among other aspects, pump 81, flange 82, wall 83, and housing 90. *See id.* at 4:11–17, 5:4–13.

3. Analysis

a. Independent Claim 1

Petitioners contend that the proposed combination of Walker and Chaffee satisfies each of the limitations of claim 1. Pet. 32–56. To support their arguments, Petitioners identify certain passages in the cited references and explain the significance of each passage with respect to the corresponding claim limitation. *Id.* Petitioners also identify reasons why one of ordinary skill in the art at the time of the invention would have been motivated to modify Walker based on Chaffee. *Id.* at 36–43. We address in turn below the subject matter of each limitation in claim 1, then Petitioners’

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identified reasons to modify Walker based on Chaffee, and then objective evidence of nonobviousness.

(1) The “Inflatable Body” Limitation

Claim 1 recites “an inflatable body.”¹⁵ Ex. 1101, 8:25 (“the ‘inflatable body’ limitation”). Petitioners state that Walker discloses this limitation. Pet. 32–33. Petitioners identify air mattress 319 shown in Figure 19 as “an inflatable body.” *Id.* at 32–33. Petitioners state that “Walker describes air mattress 319 as including ‘top, bottom, side and end walls defining an inner air chamber 321’” (*id.* at 32–33 (quoting Ex. 1110, 11:26–27) (citing Ex. 1102 ¶ 184)) and that “Walker consistently describes air mattress 319 as being ‘inflated’ by an air control apparatus 323” (*id.* at 33 (citing Ex. 1110, Abstract, 11:32–35, 11:42–45, 12:30–33, 12:61–63, 13:6–9; Ex. 1102 ¶ 185)). The record evidence, summarized above, supports Petitioners’ position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Walker discloses the “inflatable body” limitation. Patent Owner does not present arguments for this limitation.

(2) The “Fan and Motor” Limitation

Claim 1 recites “a fan and motor assembly for pumping air.” Ex. 1101, 8:26 (“the ‘fan and motor’ limitation”). Petitioners state that Walker discloses this limitation. Pet. 33–34. Referring to Figure 23 in Walker, Petitioners state that Walker discloses an air control apparatus 323

¹⁵ Petitioners take the position that the “preamble [in claim 1] is not a limitation.” Pet. 32 n.4. We agree; here, the body of the claim “sets out the complete invention” such that “the language of the preamble is superfluous.” *Schumer v. Lab. Comput. Sys., Inc.*, 308 F.3d 1304, 1310 (Fed. Cir. 2002). Patent Owner does not dispute Petitioners’ position on this issue.

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that includes electric motor 344 and impeller 348. *Id.* at 33–34 (citing Ex. 1110, 12:5–13, Figs. 23, 30, 31; Ex. 1102 ¶ 187). According to Petitioners, “motor 344 and impeller 348 constitute a fan and motor assembly for pumping air.” *Id.* at 34 (citing Ex. 1102 ¶¶ 187–189).

The record evidence, summarized above, supports Petitioners’ position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Walker discloses the “fan and motor” limitation. Patent Owner does not present arguments for this limitation.

(3) The “Built Into” Limitation

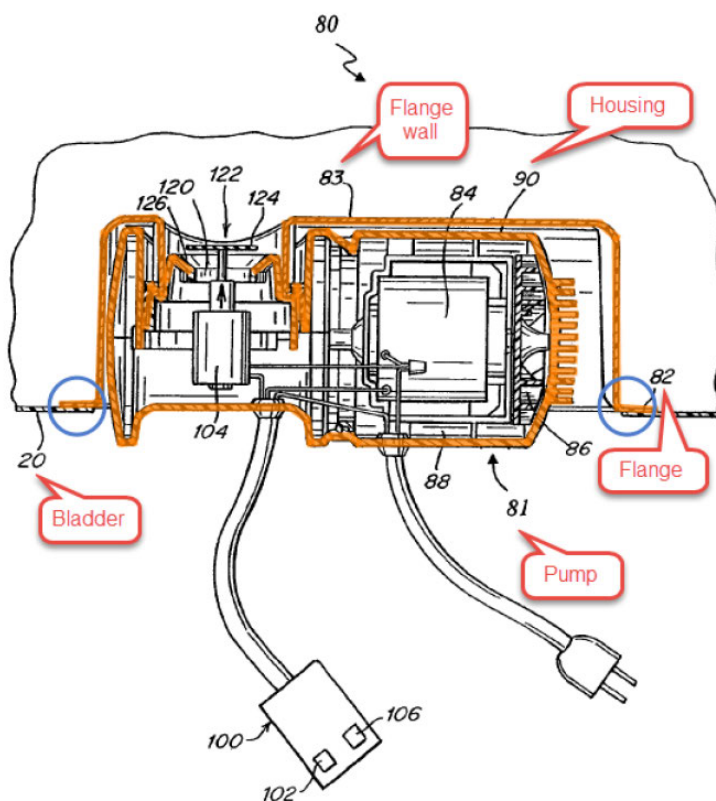
Claim 1 recites “a housing built into the inflatable body.” Ex. 1101, 8:27 (“the ‘built into’ limitation”). Petitioners state that Walker alone does not disclose this limitation, but assert that Walker as modified by Chaffee satisfies this limitation. *See* Pet. 36 (“Walker does not disclose that air control apparatus 323 having casing 328 is built into air mattress 319. However, [one of ordinary skill in the art] would have been motivated by the teachings of Chaffee and well-known design factors to build Walker’s air control apparatus 323 having casing 328 into air mattress 319.” (citing Ex. 1102 ¶ 193); *see also id.* at 35–43 (discussing this limitation). Petitioners identify flange 82, flange wall 83, and housing 90 in Chaffee, collectively, as a “housing” and identify bladder 20 as the “inflatable body.” *See id.* at 36–40 (citing Ex. 1102 ¶¶ 193–199), 38 (stating that “collectively, housing 90/flange 82/wall 83 are Chaffee’s ‘Housing’” (citing Ex. 1106, 4:21–22, 5:5–8, 7:37–38)). According to Petitioners, the identified “housing” in Chaffee is “built into bladder 20 (an inflatable body).” *Id.* at 40 (citing Ex. 1102 ¶ 198). Petitioners provide the following annotated

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version of Figure 5 of Chaffee, with (1) the three identified structural elements of “Chaffee’s Housing” (as depicted in the Figure 5 embodiment) overlaid in orange and identified with text boxes, (2) bladder 20 as well as pump 81 identified with text boxes, and (3) blue circles added around the “connection point[s]” between the identified “housing” and bladder 20:

**Fig. 5**

Pet. 39. Figure 5 of Chaffee depicts “a top, cross-sectional view of one embodiment.” Ex. 1106, 2:38–39. Referring to Figures 2 and 5 of Chaffee, Petitioners state that “Chaffee disclosed that fluid controller 80 . . . , which includes housing 90, is built into and recessed in inflatable bladder 20.” Pet. 37 (citing Ex. 1102 ¶¶ 121–123, 194), 38 (providing annotated versions of Figs. 2, 5). Petitioners state that the three identified structural elements in Chaffee were “connected to its bladder by, for example, ‘adhesive or heat

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seal’ (Chaffee, 4:67-5:2, 5:26), which a [person of ordinary skill in the art] would have understood to be a built-in connection between flange 82 and bladder 20.” Pet. 39–40 (citing Ex. 1102 ¶ 197; Ex. 1167, 23–24).

According to Petitioners, in view of these disclosures in Chaffee, one of ordinary skill in the art “would have been motivated to build Walker’s casing 328 into air mattress 319 in a similar manner” for reasons we will discuss below. *See id.* at 40 (citing Ex. 1102 ¶ 199).

Patent Owner argues that Chaffee does not disclose the “built into” limitation and thus, even if combined, Walker and Chaffee do not satisfy this limitation. PO Resp. 19–31; PO Surreply 1–4. We first address arguments related to the disclosures in Chaffee and then turn to arguments related to its prosecution history.

Patent Owner asserts that at least portions of the identified “housing” (i.e., elements 82/83/90) in Chaffee are removable from bladder 20, and thus, the “housing” fails to satisfy the “not detachable from” requirement of the “built into” limitation.¹⁶ PO Resp. 20, 28–31; PO Surreply 1–2. Specifically, Patent Owner argues that “Chaffee teaches that if the fluid controller [80] (that includes the pump) is not itself in multiple parts, *it is still removable from the bladder.*” PO Resp. 20 (citing Ex. 1106, 5:40–47; Ex. 2129 ¶ 66). According to Patent Owner,

Chaffee explains that the reason why the housing 90 and flange 82 are separate pieces and should be reversibly connected is to allow “*the removal of portions of fluid controller 80 for repair or replacement, preventing the entire inflatable device from*

¹⁶ As discussed above, we construe “built into” in accordance with its plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” *See supra* § II.B.3.

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having to be disposed of in the event of a failure of one component.”

PO Resp. 30–31 (quoting Ex. 1106, 5:44–48, with emphasis added by Patent Owner). Patent Owner contends “[i]f the fluid controller is not itself in two pieces, Chaffee indicates that the entire fluid controller (including flange 82) should be removable from the bladder.” *Id.* at 31 (citing Ex. 1106, 5:40–47.)

In their Reply, Petitioners contend that Patent Owner’s argument addresses “Chaffee’s description of an *alternative* embodiment in which flange 82 and housing 90 are separate but connected” structures. Pet. Reply 2. Petitioners argue that statements such as those at column 5, lines 33 to 35¹⁷ “demonstrate that Chaffee contemplated another design in which flange 82 and housing 90 were not separate, connectable structures but, rather, different portions of the same structure.” *Id.* (citing Ex. 1625 ¶ 20).

According to Petitioners, “Chaffee confirms this by stating ‘[f]lange 82 may, for example, extend from housing 90 or may be a separate component connected to housing 90.’” *Id.* (quoting Ex. 1625 ¶ 18 (quoting Ex. 1106, 5:7–9) (emphasis added in Ex. 1625)) (citing Ex. 1625 ¶¶ 16, 17, 19, 21).

Dr. Stevick testifies that “or” in the sentence at column 5, lines 7 to 9 of Chaffee means “said another way.” Ex. 1602, 611:15; *see also id.* at 610:21–611:5 (stating that with “or,” Chaffee is “repeating what he means”), 608:25–609:2 (stating that Chaffee uses “or” “to say it another way to be more clear”); Ex. 2129 ¶ 86 (testifying that flange 82 must be separate from housing 90). In contrast, Petitioners’ expert, Dr. Beaman, testifies that “or”

¹⁷ “*Where flange 82 connects to housing 90 or another portion of fluid controller 80, it is preferred that such connection be reversible.*” Pet. Reply 2 (quoting Ex. 1106, 5:33–35, with emphasis added by Petitioners) (citing Ex. 1625 ¶ 20).

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indicates two “alternative designs.” Ex. 1625 ¶ 18, *cited* at Pet. Reply 2–3. Although the word “or” can, in some instances, have the meaning identified by Dr. Stevick, the word “or” in the sentence at issue is used in the disjunctive sense, i.e., to indicate that what precedes it is different from, or an alternative to, what follows. *See, e.g., SkinMedica, Inc. v. Histogen Inc.*, 727 F.3d 1187, 1199–1200 (Fed. Cir. 2013) (discussing how the use of a disjunctive “or” in a specification indicates alternatives). Based on this interpretation, we understand Chaffee to disclose at least two *different* embodiments: (1) an embodiment in which flange 82 and housing 90 (as well as wall 83) are different portions of the *same* structural component and (2) an embodiment in which flange 82 and housing 90 are separate, but connected, components. *See* Ex. 1106, 5:7–11; Ex. 1625 ¶ 18. Considering the record as a whole, we credit the testimony of Dr. Beaman over that of Dr. Stevick on this issue because Dr. Beaman’s view is consistent with our understanding of Chaffee.

We turn now to the meaning of “extends from” in column 5, line 7 to 9 of Chaffee. We agree with Patent Owner that merely stating that flange 82 “extend[s] from” housing 90 does not, *by itself*, indicate whether the flange and housing are part of the same structural component or whether they are separate, but connected. *See* PO Resp. 20 n.5 (citing Ex. 2040, 268:12–272:3). Patent Owner’s view, however, analyzes “extends from” in a vacuum rather than in the context of Chaffee overall. *See* Ex. 1625 ¶ 21 (“As I testified, the ‘extend[s] from’ language in Chaffee must be read in context, as any [person of ordinary skill in the art] would do.” (citing Ex. 2040, 268:22–269:2, 269:6–8, 270:5–9)), *cited* at Pet. Reply 2–3. In context and for the reasons discussed above, we understand the presence of a

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disjunctive “or” in the same sentence to indicate that the disclosure that flange 82 may “extend from” housing 90—which precedes the “or”—would be understood as *different* from (i.e., an alternative to) the disclosure that flange 82 “may be a separate component connected to housing 90”—which follows the “or.” *See* Ex. 1106, 5:7–9.

As argued by Petitioners (Pet. Reply 2–3), Patent Owner focuses on disclosures related to embodiments in which flange 82 and housing 90 are *separate but connected*. *See* PO Resp. 20, 30–31 (discussing Ex. 1106, 5:40–48); PO Surreply 1–2 (discussing Ex. 1106, 5:33–47). We view the terms “connected,” “connects to,” and “connection” in the disclosures relied on by Patent Owner (*see* Ex. 1106, 5:40–48, *cited at* PO Resp. 20, 30–31; *see* Ex. 1106, 5:33–35, *cited at* PO Surreply 1–2) as referring back to the initial disclosure of an embodiment in which flange 82 “may be a separate component *connected to* housing 90” (Ex. 1108, 5:7–9 (emphasis added)). *See* Pet. Reply 2 (citing Ex. 1625 ¶ 20). In addition, we view the phrase “[i]n either case” (Ex. 1106, 5:44) as referring to two possible “reversible connection[s]” (Ex. 1106, 5:43–44), both of which *fall within the scope* of the initial disclosure of an embodiment in which flange 82 “may be a separate component connected to housing 90” (Ex. 1106, 5:7–9): one version in which housing 90 can disconnect from flange 82 (*id.* at 5:33–35) and another version in which the *entire* fluid controller 80 (which includes flange 82 and housing 90) can disconnect from bladder 20 (*id.* at 5:41–44). Based on the understanding discussed above of Chaffee’s disclosure that flange 82 may, for example, “extend from” housing 90, we do not agree with Patent Owner’s position that Chaffee *only* discloses embodiments in which

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at least one portion of the identified “housing” is removable from bladder

20. *See* PO Resp. 20, 30–31.

We do agree with Patent Owner’s argument, however, that Figure 5 of Chaffee does not necessarily depict an embodiment in which flange 82 and housing 90 (as well as wall 83) are different portions of the *same* structural component. *See* PO Resp. 28–29 (citing Ex. 2129 ¶¶ 82–83). That said, the *disclosures* of Chaffee are not limited to the *depictions* in the figures. And here, Petitioners have clearly relied on the statement at column 5, lines 7 to 9 of Chaffee to support their position as to the “built into” limitation. *See* Pet. 38–39; Pet. Reply 2–3.

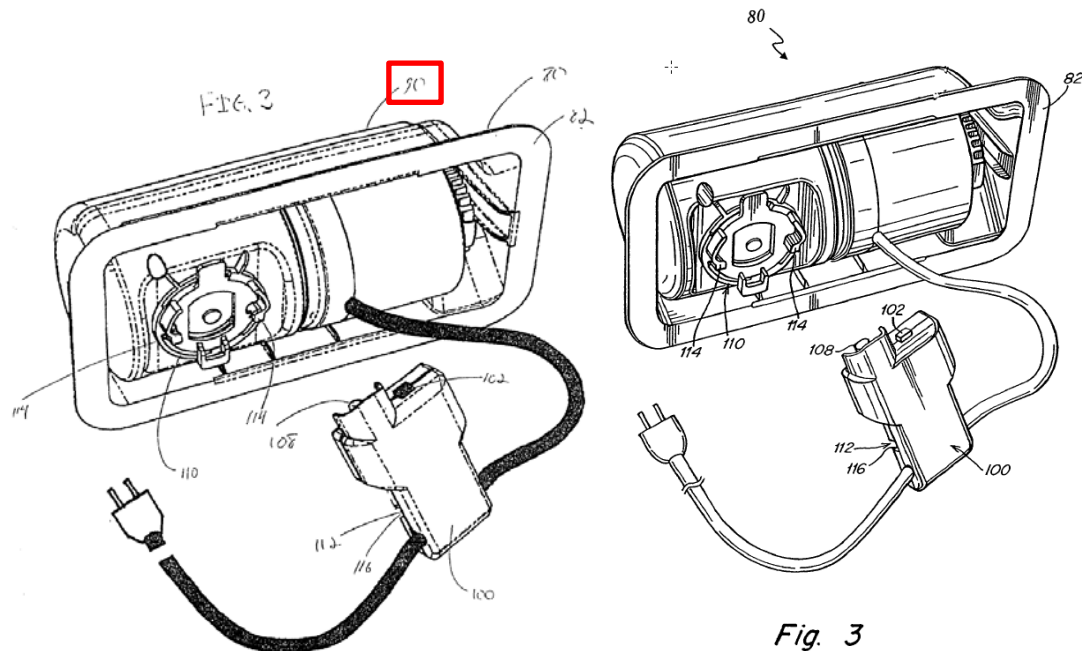
We turn now to arguments based on Chaffee’s prosecution history. Patent Owner argues that, in light of the prosecution history, one of skill in the art would not have understood Chaffee to disclose the embodiment relied on by Petitioners (as discussed above). PO Resp. 20–28, 31; PO Surreply 2–4. Patent Owner also argues that amendments to the original figures remove Chaffee as prior art in this proceeding. *Id.* We discuss each position in turn, after a background of the relevant events from the prosecution history of Chaffee, which are not in dispute.

Chaffee issued on May 9, 2006, from U.S. Patent Application No. 09/859,706 (the “’706 application”), filed on May 17, 2001. *See* Ex. 1106, (45), (21), (22). Original Figures 3 and 4 filed with the ’706 application had an additional reference numeral “90” not present in the issued version of Chaffee. Original Figure 3 and issued Figure 3 are reproduced below with a red box added to identify the additional reference numeral “90” in Original Figure 3:

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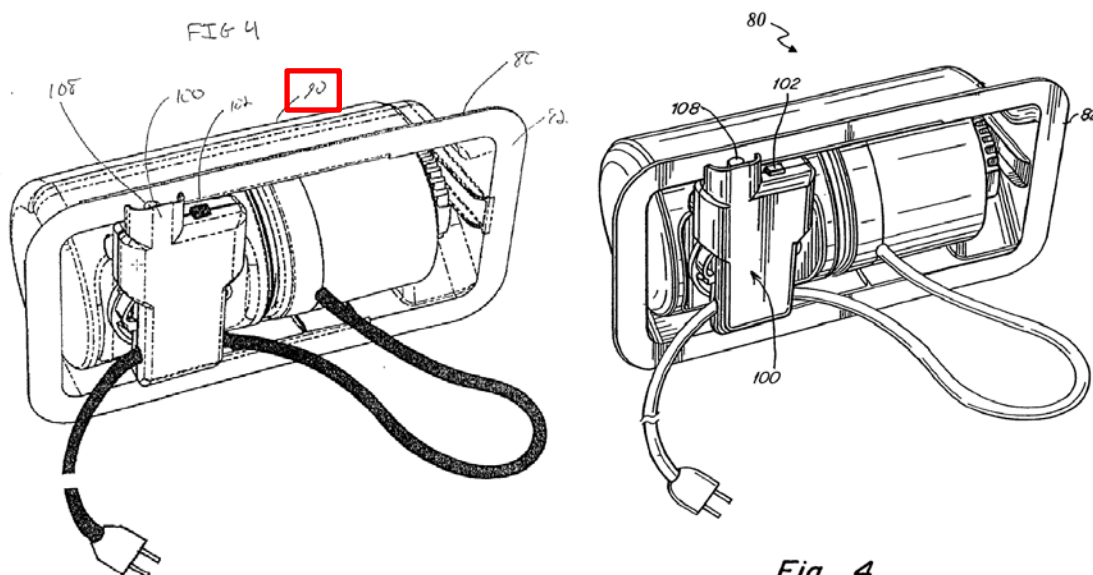
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*Fig. 3*

Ex. 2141 (file history of the '706 application), 19; Ex. 1106, Fig. 3. Figure 3 depicts a perspective view of one embodiment of fluid controller 80. *See* Ex. 1106, 2:34–35.

Original Figure 4 and issued Figure 4 are reproduced below with a red box added to identify the additional reference numeral “90” in Original Figure 4:

*Fig. 4*

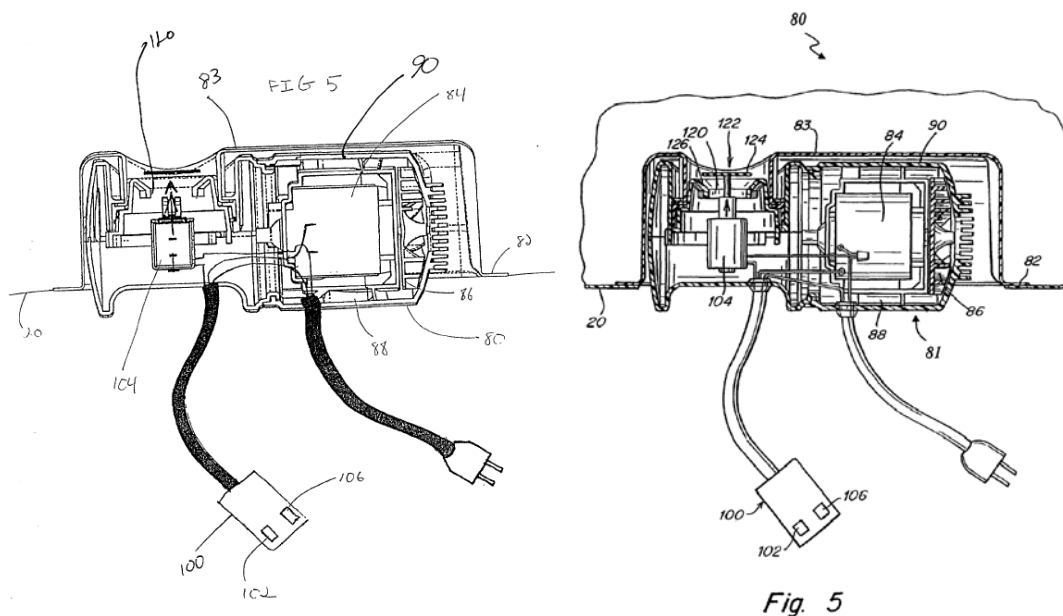
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Ex. 2141, 20; Ex. 1106, Fig. 4. Figure 4 depicts a perspective view of one embodiment of fluid controller 80. *See* Ex. 1106, 2:36–37.

Original Figure 5 and issued Figure 5 are reproduced below:



Ex. 2141, 21; Ex. 1106, Fig. 5. Figure 5 depicts a cross-sectional view of one embodiment of fluid controller 80. *See* Ex. 1106, 2:38–39. Mr. Chaffee filed formal drawings in December 2002, which included the additional reference numerals “90” from the original drawings. *See* Ex. 2141, 116–21.

In an Office Action dated September 7, 2005, the examiner objected to the drawings:

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character “90” has been used to designate both the housing (90) connected to the flange (82) as shown in Fig. 3 and the housing or covering around the motor (84), impeller (86), conduit (88), solenoid (104), etc. as shown in Fig. 5. There appear[] to be two different structures which Applicant is referring to as a “housing” and these two different structures are being confused with each other. Each of the two different structural elements should be given a separate reference numeral.

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The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference numerals “83” and “90” have both been used to designate “fluid impermeable wall” (see Fig. 5) and “housing” (see Fig. 3).

Ex. 2141, 448–49. In response, Mr. Chaffee modified the then-pending Figures 3 and 4 by deleting the additional reference numerals “90.” *See id.* at 498–99 (showing revisions to Figures 3 and 4 in an Amendment, dated December 7, 2005), 542–43 (showing revisions to Figures 3 and 4 in a Supplemental Amendment, dated December 8, 2005). In discussing these amendments, Mr. Chaffee stated: “Applicant has deleted reference character 90 from FIGS. 3 and 4 of the enclosed annotated drawings so as to eliminate any confusion.” *Id.* at 491 (Amendment), 533 (Supplemental Amendment).

With that background, we turn to Patent Owner’s arguments. Patent Owner contends that original Figures 3 and 4 “explain how the ‘extend from housing 90’ phrase [(Ex. 1106, 5:8)] was not a teaching of a one-piece ‘Chaffee Housing’ as Petitioners allege, but rather a literal description of FIGS. 3–4 as they were originally filed.” PO Resp. 21 (citing Ex. 2129 ¶¶ 66–67). According to Patent Owner,

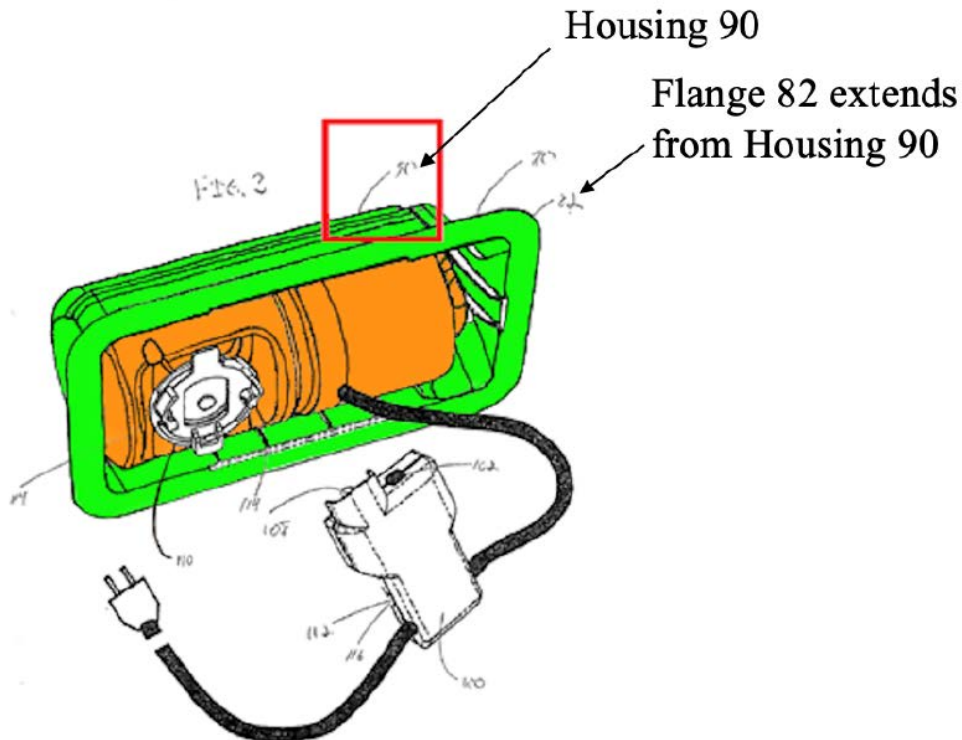
Chaffee’s original disclosure is evidence that the “extend from” phrase of Chaffee 5:7–9 is a direct reference to the green “housing” “90” structure of FIG. 3 as filed, which is fluid impermeable wall 83 in [Chaffee as issued]. ***It is not a teaching that a flange extends from the orange pump housing as Petitioners contend.***

PO Resp. 27. In support, Patent Owner provides the following annotated version of original Figure 3 of Chaffee:

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PO Resp. 26–27. The annotated version of original Figure 3 of Chaffee directly above shows (1) an outer structure overlaid in green, (2) an inner structure overlaid in orange, (3) a red box around additional reference numeral “90” with a text box stating “Housing 90” pointing to the same, and (4) a text box stating “Flange 82 extends from Housing 90” pointing to reference numeral 82. *Id.* at 27.

We are not persuaded by Patent Owner’s argument that the prosecution history of Chaffee undermines the understanding of “extend from” (Ex. 1106, 5:7–9) discussed above. As an initial matter, to the extent Patent Owner relies on the subjective intent of Mr. Chaffee during drafting, the proper analysis looks at how one of ordinary skill in the art at the time of the invention would have understood the relied-upon disclosures in the Chaffee patent. *See* PO Resp. 27 (“Had Chaffee intended the orange pump housing to be one piece with flange 82, Chaffee could have argued that the

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orange and green housings were one and the same and would not have deleted character ‘90.’”); *cf. Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1372–73 (Fed. Cir. 2019) (affirming an obviousness determination in an *inter partes* review in which a first prior art reference disclosed all of the claim limitations and a second prior art reference was used to “demonstrate that a person of ordinary skill in the art would have understood” that a teaching in the first reference satisfied a claim limitation); *see also KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (stating that the obviousness “analysis is objective”).

In addition, the complete record developed at trial does not support Patent Owner’s position as to the meaning of “[f]lange 82 may, for example, extend from housing 90.” Ex. 1106, 5:7–9. First, as noted by Petitioners (Pet. Reply 3), the text in Chaffee (i.e., the written description) has consistently used reference numeral “90” to refer to a “housing[] that surrounds the inner workings of the pump” and can “provide a connection between fluid controller 80 and bladder 20” by, e.g., flange 82 extending therefrom. *Compare* Ex. 2141, 8:5–8, 9:9–12,¹⁸ *with* Ex. 1106, 4:17–22, 5:4–9; Ex. 1106, 5:7–8. Mr. Chaffee’s statements filed with the drawing amendments at issue further support this understanding:

It is clear from the specification that the reference character 90 refers to the housing 90 that surrounds the inner workings of the pump 81, such as the motor (84), impeller (86), conduit (88), solenoid (104), etc., and can also serve as a connection between the fluid controller 80 and the bladder 20.

¹⁸ These citations to Exhibit 2041 refer to the page numbers added for this proceeding, not the internal pagination.

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Ex. 2141, 491 (Amendment), 533 (Supplemental Amendment) (same),
quoted at Pet. Reply 4.

Second, as also noted by Petitioners (Pet. Reply 3), the labelling in original Figure 5 in Chaffee—and issued Figure 5—remained unchanged as to housing 90, and consistently supported the understanding of housing 90 as a structure surrounding the inner workings of the pump (rather than identifying the structure referred to as wall 83 in Chaffee as issued).¹⁹ *See* Ex. 2141, 21 (original Figure 5), 119 (formal version of original Figure 5), 500 (showing revisions in Amendment), 544 (same in Supplemental Amendment), 508 (showing issued version in Amendment), 552 (same in Supplemental Amendment); Ex. 1106, Fig. 5, 5:10–11 (discussing “fluid impermeable wall 83”). In light of the complete record, we find that one of ordinary skill in the art would have understood housing 90 as a structure that “surrounds the inner workings of the pump” and can “provide a connection between fluid controller 80 and bladder 20” by (in one embodiment) flange 82 extending from housing 90 as a different portion of the same structural component.

We turn now to Patent Owner’s argument that the amendments discussed above remove Chaffee as prior art in this proceeding. PO Resp. 19–28, 31; PO Surreply 2–4. Relevant to this issue, Petitioners state: “Chaffee is prior art under 35 U.S.C. § 102(e) as it stems from a nonprovisional application (Application No. 09/859,706) that was filed on

¹⁹ As discussed above, however, we agree with Patent Owner that Figure 5 does not necessarily depict an embodiment in which flange 82 and housing 90 (as well as wall 83) are different portions of the *same* structural component. *See supra* pp. 35–36.

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May 17, 2001 (*see generally* Ex. 1106), which precedes the June 22, 2001 Priority Date of the '394 Patent.” Pet. 37 n.5. As noted above, the amendments were filed in December 2005. Patent Owner argues that, by deleting the reference numerals “90” from original Figures 3 and 4, Mr. Chaffee “attempted to redefine housing 90 as only that housing that ‘surrounds the inner workings of the pump 81 [‘81’ was simultaneously newly added to FIG. 5 to replace ‘80.’].” PO Resp. 27 (citing Ex. 2141, 491, 500) (bracketed text added by Patent Owner). Patent Owner notes that the amendments “were made starting in 2005, years after the 2001 effective filing date of the '394 Patent.” *Id.* Patent Owner contends that Chaffee’s “modified disclosure is not a printed publication.” *Id.* at 19.

As an initial matter, we are not persuaded that, with the amendments, Mr. Chaffee “redefined” housing 90. Instead, for the reasons discussed above (*see supra* pp. 38–42), the record supports Petitioners’ argument that the amendments merely aligned Figures 3 and 4 with the rest of the specification as to housing 90. Pet. Reply 4–5. Further, we understand Patent Owner to contend that the amendments constitute new matter and that, based on that alleged new matter, the effective filing date of Chaffee is now in December 2005, which would post-date the effective filing date of the '394 patent. *See, e.g., Nat. Alt. Int’l v. Iancu*, 904 F.3d 1375, 1383 (Fed. Cir. 2018) (discussing how new matter added during prosecution can change the effective filing date of a prior art reference); *see also* PO Resp. 31 (arguing that “due to the substantial modifications in Chaffee after the '394 Patent priority date, Chaffee cannot in any event be used as prior art on the issue of whether a pump housing is built in” (citing Ex. 2129 ¶¶ 85–88)); PO Surreply 3 (stating that “new matter is a basis for forfeiting an effective

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filing date”). Patent Owner argues that the amendments “are not immaterial” and that “[t]here is no support in Chaffee for deleting reference numbers on figures without changing scope.” PO Surreply 3.

Petitioners argue persuasively that Patent Owner does not adequately explain *why* the amendments amount to new matter. *See* Pet. Reply 4 (contending that this argument is “undeveloped” and “cursory” and that Patent Owner has not “articulated a cognizable new matter argument”). For the same reasons discussed above, Petitioners present sufficient arguments and evidence to support a finding that the amendments merely removed clerical errors in the original drawings to align those drawings with the rest of the specification as to housing 90, and thus, did not constitute new matter. *See id.* at 4–5.²⁰ As noted by Petitioners, the examiner did not issue a new matter objection in the wake of the amendments. *See id.* at 5 (citing *Commonwealth Sci. v. Buffalo Tech.*, 542 F.3d 1363, 1380 (Fed. Cir. 2008)).

For the reasons above, we find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Walker as modified by Chaffee discloses the subject matter of the “built into” limitation.²¹

(4) The “Interior Region” Limitation

Claim 1 recites “the housing having an interior region.” Ex. 1101, 8:27–28 (“the ‘interior region’ limitation”). Petitioners contend that Walker discloses this limitation. Pet. 35–36. Petitioners provide the following

²⁰ For similar reasons, we do not agree with Patent Owner that the amendments rendered Chaffee “ambiguous.” PO Surreply 3–4.

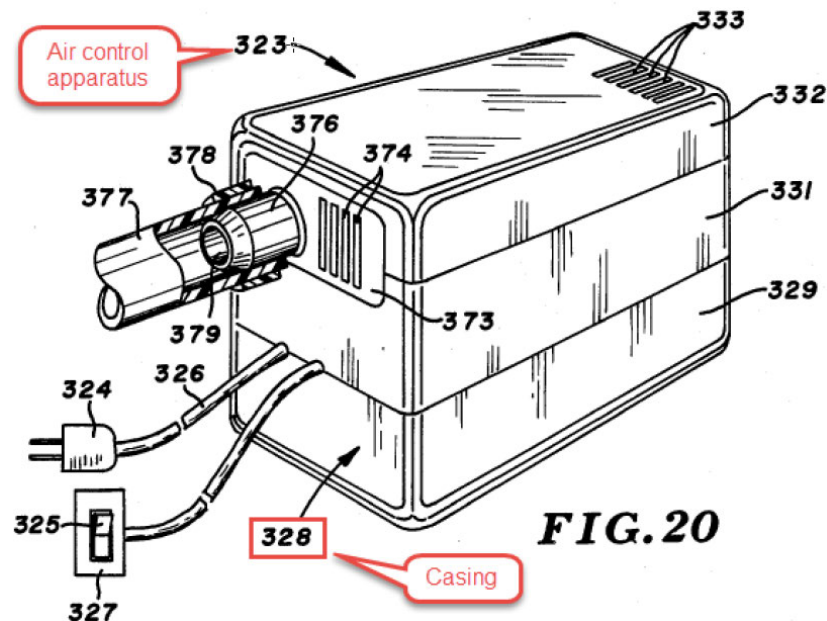
²¹ We address below Patent Owner’s arguments that one of ordinary skill in the art would not have modified Walker based on Chaffee as proposed. *See infra* § II.C.3.a.7.

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annotated version of Figure 20 of Walker, which adds text boxes identifying air control apparatus 323 and casing 328.



Pet. 36. Figure 20 of Walker depicts an embodiment of an air pump and air control apparatus used in the disclosed sofa sleeper. *See* Ex. 1110, 4:18–20, 11:32–35. Petitioners state that “Walker’s casing 328 is a housing that has an interior region.” Pet. 35 (citing Ex. 1110, 11:48–49, Figs. 20–30).

According to Petitioners, “casing 328 (the housing) includes an interior region in which various components of the air control apparatus 323 are located.” *Id.* (citing Ex. 1110, 12:5–13:18, Figs. 20–30; Ex. 1102 ¶ 192).

The record evidence, summarized above, supports Petitioners’ position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Walker discloses the “interior region” limitation. Patent Owner does not present arguments for this limitation.

(5) *The “Air Conduit” Limitation*

Claim 1 recites:

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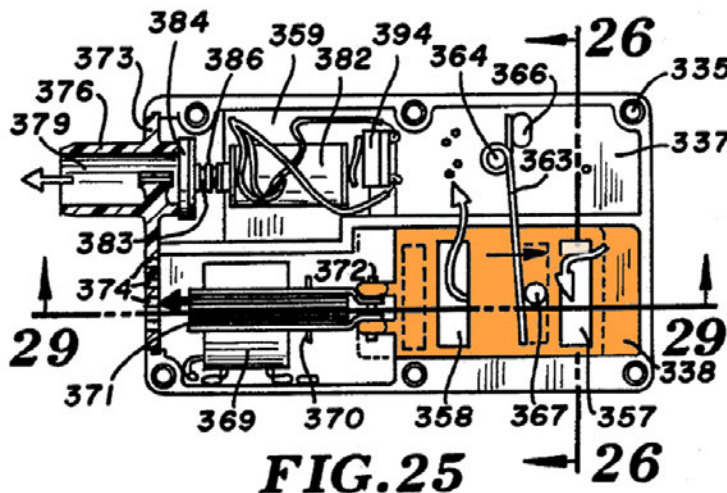
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an air conduit disposed at least in part in the housing, the air conduit being movable between a first position and a second position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position.

Ex. 1101, 8:29–35 (“the ‘air conduit’ limitation”). Petitioners argue that Walker discloses this limitation. Pet. 43–55 (citing Ex. 1102 ¶¶ 206–221).

Petitioners provide the following annotated version of Figure 25 of Walker, which adds orange overlay to gate 338.



Pet. 44. Figure 25 depicts a horizontal cross-sectional view of apparatus 323 (shown in Figure 20) at the height of air hose 377. See Ex. 1110, 4:18–22, 4:29–30. Referring to annotated Figure 25, Petitioners state that “Walker disclosed a gate 338 (the movable air conduit) (orange) with openings 357, 358, movable between a first and second position, for controlling inflation and deflation of air mattress 319 depending on the positioning of gate 338.” Pet. 43 (citing Ex. 1110, 3:5–8, 3:28–31, 3:39–41, 12:22–38; Ex. 1102 ¶ 207). Petitioners argue that “Walker’s gate 338 (the air conduit) has a first position in which the motor 344 and impeller 348 (the fan and motor) inflate

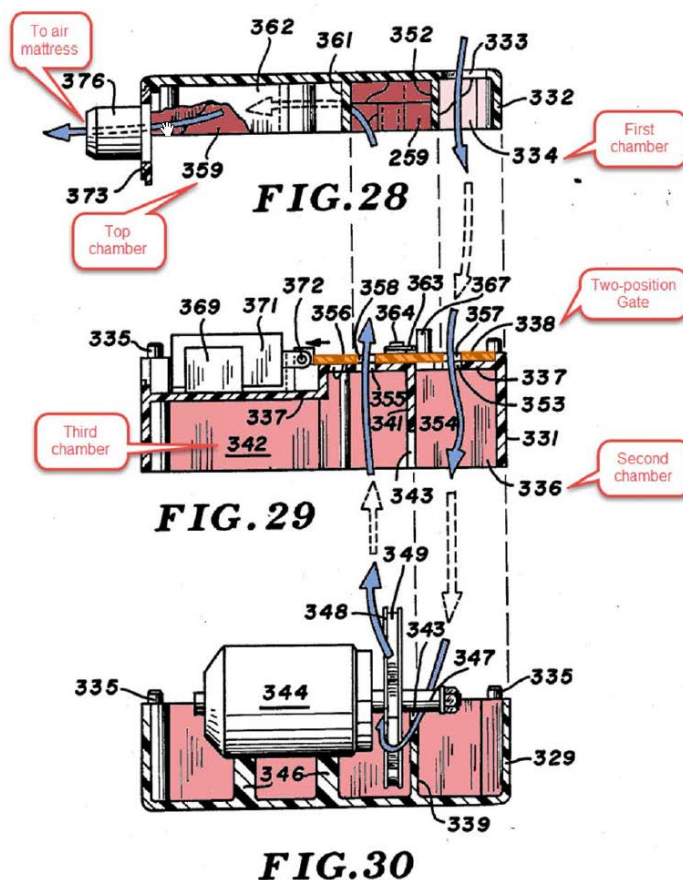
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the air mattress 319 (the inflatable body), and all times gate 338 remains disposed in casing 328 (the housing).” *Id.* at 44 (citing Ex. 1102 ¶ 209); *see also* Pet. 44–45 (showing gate 338, colored in orange, in the identified “first position”) (citing Ex. 1110, 12:28–30; Ex. 1102 ¶ 210).

Petitioners provide the following annotated versions of Figures 28–30 of Walker, which add (1) blue overlay to show air flow, (2) text boxes and red overlay to identify various chambers, (3) a text box to identify an air flow going “[t]o air mattress,” (4) a text box identifying element 338 as a two-position gate, and (5) orange overlay for gate 338.



Pet. 47. Figures 28–30 show sectional views at different locations within the air control apparatus. Ex. 1110, 4:35–40. Referring to these annotated Figures, Petitioners state, “[w]hen motor 344 is operating and gate 338

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[orange] is in [this] *first position*, the air [blue arrows] pumped by the rotating impeller 348 will flow through passage 379 and hose 377 to inflate air mattress 319.” Pet. 46 (quoting Ex. 1110, 13:6–9, with bracketed text added by Petitioners) (citing Ex. 1102 ¶ 211).

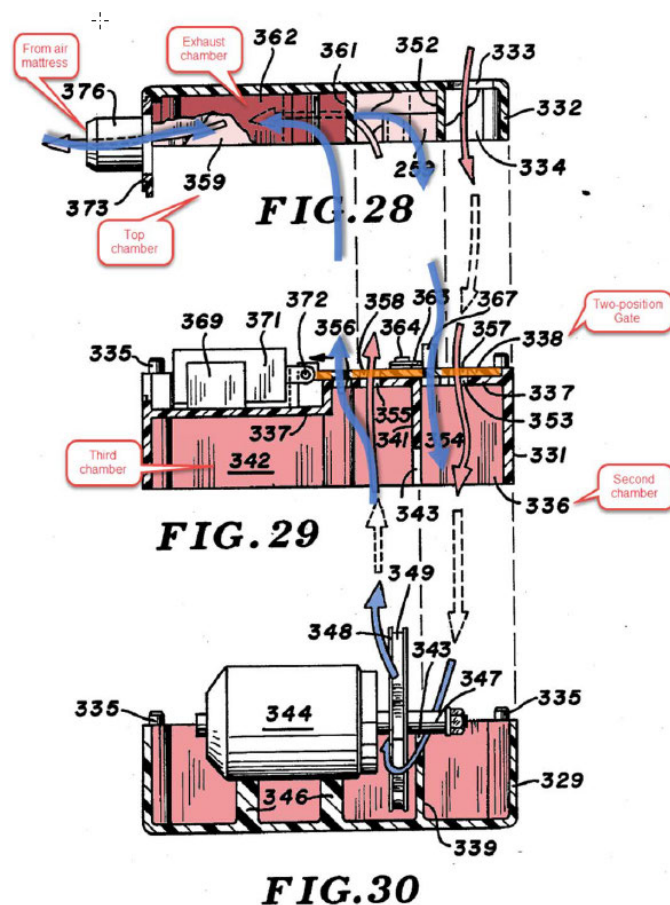
Petitioners also argue that “Walker’s gate 338 (the air conduit) is also movable to a second position while remaining disposed at least in part in the casing 328 (the housing) and, in this second position, the motor 344 and impeller 348 (the fan and motor) deflate the air mattress 319 (the inflatable body).” Pet. 50 (citing Ex. 1102 ¶¶ 215–221); *see also* Pet. 50 (citing Ex. 1110, 12:25–27; Ex. 1102 ¶ 215) (showing gate 338 in the identified “second position”).

Petitioners provide the following annotated versions of Figures 28–30 of Walker, which add (1) blue overlay to show air flow, (2) text boxes and red overlay to identify various chambers, (3) a text box to identify an air flow going “[f]rom air mattress,” (4) a text box identifying element 338 as a two-position gate, and (5) orange overlay for gate 338.

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Pet. 52. Figures 28–30 show sectional views at different locations within the air control apparatus. Ex. 1110, 4:35–40. Referring to these annotated Figures, Petitioners state:

“When gate 338 [orange] is moved to th[is] second position, gate openings 357 and 358 are in alignment with openings 35410 and 356, respectively,” such that “air [blue arrows] in top chamber 359 [light red] [can] flow through second and third chambers 336 and 342 [both in red] into exhaust chamber 368 [in dark red] to draw air out of the air mattress 319.”

Pet. 53 (quoting Ex. 1110, 12:33–38, with bracketed text added by Petitioners) (citing Ex. 1102 ¶ 218; Ex. 1110, 3:35–43, 13:9–12, 13:14–17). The record evidence, summarized above, supports Petitioners’ position as to this limitation, which we adopt as our own. We find, based on the complete

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record, that Petitioners have demonstrated by a preponderance of the evidence that Walker discloses this limitation. Patent Owner does not present arguments for this limitation.

(6) The “Wherein” Limitation

In the final clause, claim 1 recites “wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.” Ex. 1101, 8:36–38 (“the ‘wherein’ limitation”). Petitioners state that Walker discloses this limitation. Pet. 55–56 (citing Ex. 1102 ¶¶ 222–224). According to Petitioners, Walker discloses “that when gate 338 is in a first, inflating position, air flows from the interior region of casing 328 (the housing) to the air mattress 319 (the inflatable body)—i.e., between the interior region of the casing 328 and air mattress 319.” Pet. 55 (citing Pet. 43–55; Ex. 1110, 3:5–8, 12:27–33, 13:6–9; Ex. 1166, at [00:00 – 00:47]; Ex. 1102 ¶ 223). Petitioners state that Walker also discloses “that when gate 338 is in a second, deflating position, air flows from air mattress 319 (the inflatable body) to the interior region of casing 328 (the housing)—i.e., between the interior region of the casing 328 and the inflatable body.” Pet. 56 (citing Pet. 43–55; Ex. 1110, 3:5–8, 12:33–38, 13:9–17; Ex. 1166, at [00:47 – 01:14]; Ex. 1102 ¶ 224). The record evidence, summarized above, supports Petitioners’ position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Walker discloses this limitation. Patent Owner does not present arguments for this limitation.

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(7) The Asserted Reasons to Modify Walker with Chaffee

Petitioners assert that, based on Chaffee, one of ordinary skill in the art “would have been motivated to build Walker’s casing 328 into air mattress 319” because one of ordinary skill in the art would have:

- (1) “recognized the built-in design to be more time- and labor-efficient, as it enhanced user convenience” (Pet. 40–41 (citing Ex. 1102 ¶ 200));
- (2) “recognized that a built in design would have enhanced the spatial efficiency of the inflatable product” (*id.* at 41 (citing Ex. 1102 ¶ 201 and Ex. 1106, 4:50–56));
- (3) “recognized that a built in design would have increased the durability of the inflatable product” (*id.* at 41–42 (citing Ex. 1102 ¶ 202));
- (4) “recognized that a built-in design would have improved the cost and marketability of the system while retaining desired functionality and quality” (*id.* at 42 (citing Ex. 1102 ¶ 203)); and
- (5) “recognized this design modification to be nothing more than an obvious combination of familiar elements using known methods to achieve a predictable result” (*id.* (citing Ex. 1102 ¶ 204)).

Patent Owner challenges the reasoning provided by Petitioners (and summarized in the prior paragraph) as to why one of ordinary skill in the art at the time of the invention would have allegedly modified Walker based on Chaffee. PO Resp. 18–19, 31–39; PO Surreply 4–8.

Spatial Efficiency

As discussed above, Petitioners assert that one of ordinary skill in the art would have viewed the proposed modification—i.e., building casing 328

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into air mattress 319 in Walker—as providing improved “spatial efficiency.” See Pet. 41 (citing Ex. 1102 ¶ 201; Ex. 1106, 4:50–59; Ex. 1113, 2:40–52; Ex. 1115, 8; Pet. 8–21). Patent Owner argues that one of skill in the art would *not* have modified Walker as proposed for spatial efficiency reasons. PO Resp. 34–35.

The record here supports Petitioners’ assertion that one of skill in the art would have been motivated by the improved spatial efficiency of the proposed modification in that Walker’s casing 328, once housed in mattress 319, would have had a more compact *overall* design and thus a reduced opportunity to “impact or interfere with the use of” air mattress 319. Pet. 41 (quoting Ex. 1106, 4:50–56 (“In one embodiment, the exterior profile (total volume and shape) of the fluid controller and inflated device in combination are essentially the same as the exterior profile of the inflated device absent the combination, thus reducing the opportunity for fluid controller 80 to impact or interfere with the use of inflatable device 10.”) (citing Pet. 8–21 (discussing the “State of the Art”)); *see also* Pet. 17 (discussing how “prior art inventors began designing more **compact, space-efficient** pumps by containing the pump components in an enclosure or housing” (citing Ex. 1102 ¶¶ 92–93; Ex. 1110, Figs. 20–31; Ex. 1130, Figs. 3B, 7; Ex. 1131, Figs. 1–7, 11; Ex. 1145, Figs. 1, 4–6; Ex. 1137, Figs. 8–9)).

In addition, Petitioners contend that the more compact overall design of the modified device would have generated an additional benefit in that “air mattress 400 would have, for example, ‘fit into a standard sized bed frame.’” Pet. 41 (quoting Ex. 1106, 4:56–59) (citing Ex. 1102 ¶ 201; Ex. 1113, 2:40–52). Petitioners support this reasoning with the testimony of Dr. Beaman. *See, e.g.*, Ex. 1102 ¶ 201 (discussing how “spatial efficiency

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... is one of the five key design factors [one of ordinary skill in the art] would have considered” (emphasis omitted)).

Patent Owner counters that “[t]he sofa in Walker has plenty of internal room to hold the pump without putting it in the air mattress.” PO Resp. 34. According to Patent Owner, because “the Walker pump is part of a large, permanent sofa structure with plenty of room for storage outside the air mattress, building the pump into the mattress of the bed is unnecessary.” *Id.* at 19. Patent Owner contends that “Dr. Beaman testified that a pump could be attached to a shelf or something built into the base of a sofa bed, without having to put it into the air mattress, and that moving such a design would have the pump move with it.” *Id.* (citing Ex. 2040, 140:1–16, 250:18–251:7; Ex. 2129 ¶ 65).

Patent Owner’s argument that alternative, and *even potentially superior*, modifications to Walker exist—such as building casing 328 into the sofa rather than into air mattress 319 (as proposed)—does not undermine the reasoning supporting the proposed modification. *See In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012) (that “better alternatives” may exist in the prior art “does not mean that an inferior combination is inapt for obviousness purposes”); Pet. Reply 8–9 (citing *In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004) (stating that the “law does not require that a particular combination must be the preferred, or the most desirable, combination described in the prior art in order to provide motivation for the current invention”)).

Patent Owner also asserts that “building a pump into Walker’s mattress assembly 314 would interfere with the essential folding structure and function of the sofa sleeper and potentially cause the sleeper

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discomfort.” PO Resp. 34. According to Patent Owner, one of ordinary skill in the art “would recognize that reconfiguring the mattress assembly 314 to allow folding as needed, while avoiding intrusion of the pump to a user in both positions would make the combination more difficult, and more expensive, to manufacture.” *Id.* (citing Ex. 2129 ¶ 96); *see also id.* at 19 (citing Ex. 2129 ¶ 63) (arguing that one of ordinary skill in the art “would know that any additional parts, like a pump and housing, that could impede folding the bed or damage it when folding or unfolding are undesirable, and would be avoided”). Patent Owner further argues that one of ordinary skill in the art “would understand that a sofa sleeper design does not benefit from embedding a pump in the inflatable body; but rather is impaired by having a solid and non-compressible structure in an otherwise compressible structure that must be folded and must provide a uniform surface for a user in both folded and unfolded positions.” *Id.* at 35 (citing Ex. 2129 ¶ 97).

Patent Owner’s assertions that the modified device would cause these issues are not convincing. *See* Pet. Reply 5–6 (asserting that these arguments “are unsupported”). The relied-upon testimony of Dr. Stevick essentially repeats Patent Owner’s argument with no additional analysis, facts, or data, and thus we afford it little weight. *Compare* Ex. 2129 ¶¶ 63, 96–97, *with* PO Resp. 19, 34–35; 37 C.F.R. § 42.65(a). Instead, we are more persuaded by Dr. Beaman’s testimony (which is consistent with the underlying information and analysis) that the proposed modifications would not have led to the issues identified, and that any necessary modifications were within the level of ordinary skill in the art. *See* Ex. 1625 ¶¶ 34, 36, 37, 39, *cited at* Pet. Reply 6–8. For example, as noted by Petitioners and Dr. Beaman, prior art references—such as U.S. Patent No. 4,862,533—describe

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pumps built into mattresses, which are then foldable. *See* Pet. Reply 6–7 (citing Ex. 1625 ¶ 37; Ex. 1109; Ex. 1635, 502:24–503:7; Ex. 1636, 666:2–19).

Patent Owner also argues that one of ordinary skill in the art would have “underst[oo]d that heat might build up due to the lack of airflow around the motor and pose a risk of overheating and be a potential fire hazard.” PO Resp. 35 (citing Ex. 2129 ¶ 97). As discussed further below (*see infra* pp. 57–58), the record does not support the argument that the modified device would have overheated or been a fire hazard. Moreover, this argument is not persuasive because the relied-upon testimony of Dr. Stevick again essentially repeats Patent Owner’s position with no additional analysis, facts, or data. *Compare* Ex. 2029 ¶ 97, *with* PO Resp. 35; 37 C.F.R. § 42.65(a).

Durability

As discussed above, Petitioners assert that one of ordinary skill in the art would have viewed the proposed modification as providing improved “durability.” *See* Pet. 41–42 (citing Ex. 1102 ¶ 202; Ex. 1123, 1:9–14, 2:123–132, 3:18–22, Fig. 1; Ex. 1154, 1:29–31; Pet. 8–21). Patent Owner argues that one of skill in the art would *not* have modified Walker as proposed for durability reasons. PO Resp. 35–36; PO Surreply 6–7.

Here, Petitioners provide convincing arguments backed by credible evidence to support their assertion that one of skill in the art would have been motivated by the increased durability of the proposed modification in that Walker’s casing 328, once housed in mattress 319, would have been better protected “from ‘accident, injury, or separation’ from the mattress.” Pet. 41–42 (quoting Ex. 1123, 2:123–132) (citing Ex. 1102 ¶ 202; Ex. 1123, Fig. 1, 1:9–14, 2:123–132, 3:18–22; Ex. 1154, 1:29–31 (describing built-in

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air pumps as being “resistant to chemical and physical attack, especially to moisture and oxidation”); Pet. 8–21 (discussing the “State of the Art”)); *see also* Pet. 19 (discussing how “prior art inventors recognized that a pump built-into the inflatable body better protected the pumps and, therefore, resulted in more durable products” (citing Ex. 1102 ¶¶ 104–105; Ex. 1123, Fig. 1, 1:9–14, 2:123–132, 3:18–22; Ex. 1154, 1:29–31)). This reasoning is supported by the testimony of Dr. Beaman. *See* Ex. 1102 ¶ 202 (discussing how “durability . . . is one of the five key design factors [one of ordinary skill in the art] would have considered” (emphasis omitted)) and discussing how a built-in design “would have improved durability during manufacturing, as the housing would have protected the components during assembly”).

According to Patent Owner, one of skill in the art would have understood “that built in designs can add stress to the material of the inflatable product, and that stress would be increased by the folding and unfolding of the Walker mattress 319 having a casing 328 installed in the mattress.” PO Resp. 35 (citing Ex. 2129 ¶ 98). Patent Owner’s argument in this regard is not convincing because other than repeating Patent Owner’s argument, Dr. Stevick’s testimony is devoid of additional analysis, facts, or data. *Compare* Ex. 2129 ¶ 98, *with* PO Resp. 35. Moreover, as noted by Petitioners, “this motivation relates to the **combination** of air mattress 319 and pump 323, not simply the air mattress 319 itself.” Pet. Reply 10 (citing Ex. 1625 ¶¶ 43–45 (citing Ex. 1123); Ex. 1636, 663:1–3, 664:4–13).

Patent Owner also contends that such “designs can also add heat to the material, resulting in faster aging and potential breakdown of the material” and that one of skill in the art would have understood “that overheating

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would be more likely in the Walker design, because mattress assembly 314 would block the flow of air from any pump located within it.” PO Resp. 35–36 (citing Ex. 2129 ¶ 98; Ex. 1110, 11:21–31, Fig. 19). As discussed further below (*see infra* pp. 57–58), the record does not support the argument that the modified device would have overheated.

Additional Asserted Reasons to Modify Walker with Chaffee

We have reviewed Petitioners’ additional asserted reasons to modify Walker based on Chaffee (which are argued in the alternative), and we determine that those reasons are not as strongly supported by the record as the two reasons discussed above (spatial efficiency and durability). For example, Petitioners have not provided adequate argument and record support for the assertions that one of ordinary skill in the art would have (1) “recognized the built-in design to be more time- and labor-efficient, as it enhanced user convenience” (Pet. 40–41 (citing Ex. 1102 ¶ 200)), (2) “recognized that a built-in design would have improved the cost and marketability of the system while retaining desired functionality and quality” (*id.* at 42 (citing Ex. 1102 ¶ 203)), and (3) “recognized this design modification to be nothing more than an obvious combination of familiar elements using known methods to achieve a predictable result” (*id.* (citing Ex. 1102 ¶ 204)).

Patent Owner’s Additional Arguments

In addition to the arguments discussed above addressing the alleged improved spatial efficiency and durability of the proposed modification, Patent Owner provides other arguments as to why one of ordinary skill in the art would not have modified Walker based on Chaffee. Patent Owner argues that “placing Walker’s air pump in the mattress of a sofa sleeper would not

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be more convenient because Walker's sofa already has hand control 327 on the sidearm 312 to make it convenient to inflate or deflate the air mattress 319." PO Resp. 19 (citing Ex. 1110, 11:32–47, Fig. 17; Ex. 2129 ¶ 64).

This argument does not demonstrate a deficiency in Petitioners' positions as to the two reasoning statements above because Petitioners do not assert improved convenience for those motivations. Moreover, the fact that an unclaimed benefit highlighted in the '394 patent may not be present in the context of the modified device does not undermine the motivation statements provided by Petitioners. *See Alcon Res., Ltd. v. Apotex, Inc.*, 687 F.3d 1362, 1368 (Fed. Cir. 2012) ("We have repeatedly held that the motivation to modify a prior art reference to arrive at the claimed invention need not be the same motivation that the patentee had."); Ex. 1101, 1:32–33 (disclosing that one "object" of the '394 patent "is to provide an air mattress, easily operated and conveniently carried").

Patent Owner also argues that one of ordinary skill in the art "would appreciate that incorporation of pump casing 328 into air mattress 319 would require a more complex (and therefore more expensive) folding frame design to accommodate the rigid structure in the otherwise collapsible air mattress to move into the folded, 'sofa,' position of FIG. 17." PO Resp. 33 (citing Ex. 2129 ¶ 93). Patent Owner also asserts that the proposed modifications would (1) "pose a risk of overheating and be a potential fire hazard," (2) be "more expensive than the Walker design," (3) "result[] in more design effort," (4) require a "more complex structure and fabrication process," and (5) require casing 328 "to be substantially redesigned, virtually reinvented." *Id.* at 35–38 (citing Ex. 2129 ¶¶ 97, 100–103). These assertions are not convincing. For example, Patent Owner cites the

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testimony of Dr. Stevick; however, Dr. Stevick merely restates the arguments with no additional analysis, facts, or data. *Compare* PO Resp. 35–38, *with* Ex. 2129 ¶¶ 97, 100–103; 37 C.F.R. § 42.65(a); *see also* Pet. Reply 5 (stating that aspects of these arguments are “unsupported”), 6 (arguing that neither Patent Owner “nor its expert cites any evidence that [one of ordinary skill in the art] would have been deterred from a combination of Walker and Chaffee in view of these supposed problems”).

Instead, we are more persuaded by Dr. Beaman’s testimony (which is consistent with the underlying information and analysis), that the proposed modifications would not have led to the technical issues identified, and that any necessary modifications were within the level of ordinary skill in the art. *See* Ex. 1625 ¶¶ 34–39, *cited at* Pet. Reply 6–8. Moreover, as to the alleged overheating, to the extent Patent Owner contends that *all* built-in pumps have overheating issues, that draws into question how the applicant in the ’394 patent overcame such a common problem when this issue is not discussed in the ’394 patent. *See Smith & Nephew, Inc. v. Rea*, 721 F.3d 1371, 1381–82 (Fed. Cir. 2013) (addressing a patent owner’s argument as to an alleged technical issue in the proposed combination, stating that “[t]his naturally raises the question of how [patent owner] managed to make such a combination work”), *cited at* Pet. Reply 7.

Patent Owner next argues that “Dr. Beaman admitted that attempting to integrate the Walker pump into an air mattress presents many design

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challenges that are solved by leaving the pump housing external.” PO

Surreply 5 (citing “Beaman 5/6/19 Dep., 212:4-218:2”).²²

Although the cited testimony by Dr. Beaman does identify certain design considerations with the proposed modified device, we do not agree with Patent Owner that Dr. Beaman “admitted” that these considerations show sufficiently that one of ordinary skill in the art *would not have been* motivated to perform the modification proposed. *See* IPR2018-00870, Ex. 2753, 217:18–218:2 (“Q. One way that you could design a sofa not to have [pump damage] that happen is to keep the pump out of the air mattress the way that Walker already does; correct? A. I assume so, yeah, but it is – and you lose some of the other -- the other considerations.”); *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (“[A] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.”).

For the reasons above, we determine, in light of the complete record, that Petitioners have shown that one of ordinary skill in the art at the time of the invention would have been motivated to modify Walker based on Chaffee, as proposed, for at least the purposes of improved spatial efficiency and improved durability.

²² Patent Owner does not appear to have filed this deposition transcript in this proceeding. We refer to Exhibit 2753 in IPR2018-00870, which appears to be the transcript at issue. Given that this proceeding (IPR2018-00871) is listed on the cover of the deposition transcript at issue, we consider Patent Owner’s failure to file that transcript in *this* proceeding to have been merely a clerical error. *See* IPR2018-00870, Ex. 2753, 1 (listing IPR2018-00870, IPR2018-00871, IPR2018-00872, and IPR2018-00875).

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(8) Objective Evidence of Nonobviousness

We turn next to Patent Owner’s objective evidence of nonobviousness and Petitioners’ rebuttal evidence. Objective evidence of nonobviousness, when present, must always be considered as part of an obviousness inquiry. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012). Notwithstanding what the teachings of the prior art would have suggested to one with ordinary skill in the art at the time of the patent’s invention, the totality of the evidence submitted, including objective evidence of nonobviousness, may lead to a conclusion that one or more of the Challenged Claims would not have been obvious to one with ordinary skill in the art. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Objective evidence may include long-felt but unsolved need, failure of others, unexpected results, commercial success, copying, licensing, and praise. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *Leapfrog Enters., Inc. v. Fisher–Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007).

“For objective evidence to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.” *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). A nexus must be demonstrated for all types of objective evidence of nonobviousness. *See id.* (addressing nexus generally); *Rambus Inc. v. Rea*, 731 F.3d 1248, 1256 (Fed. Cir. 2013) (addressing long-felt need); *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012) (addressing copying); *In re Kao*, 639 F.3d 1057, 1069 (Fed. Cir. 2011) (addressing unexpected results); *Muniauction, Inc. v. Thomson Corp.*, 532 F.3d 1318, 1328 (Fed. Cir. 2008) (addressing praise); *In re Huang*, 100

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F.3d 135, 140 (Fed. Cir. 1996) (addressing commercial success). The stronger the showing of nexus, the greater the weight accorded the objective evidence of nonobviousness. *See GPAC Inc.*, 57 F.3d at 1580 (“To the extent that the patentee demonstrates the required nexus, his objective evidence of nonobviousness will be accorded more or less weight.”); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 306 (Fed. Cir. 1985). Conversely, the stronger the showing of nexus, the greater the weight accorded the objective evidence of nonobviousness.

“[T]here is a presumption of nexus for objective considerations when the patentee shows that the asserted objective evidence is tied to a specific product and that product ‘is the invention disclosed and claimed in the patent.’” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1329 (Fed. Cir. 2016) (internal citation omitted); *see also PPC Broadband, Inc. v. Corning Optical Commc’ns RF, LLC*, 815 F.3d 734, 747 (Fed. Cir. 2016) (“Because the evidence shows that the SignalTight connectors are ‘the invention disclosed and claimed in the patent,’ we presume that any commercial success of these products is due to the patented invention This is true even when the product has additional, unclaimed features.”) (internal citations omitted).

Patent Owner produces evidence directed to alleged commercial success, copying, failure to use alternatives, broad acceptance, praise, licensing, long-felt need, and skepticism of others²³. PO Resp. 62–70. We address each of these indicia in turn, below, for all of the Challenged Claims. First, however, we address nexus generally.

²³ Patent Owner characterizes this indicium of nonobviousness as “against conventional wisdom.” PO Resp. 70.

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Nexus

As we explain in greater detail below, based on the complete record, we determine that Patent Owner is entitled to a presumption of nexus with respect to certain Challenged Claims because Patent Owner has “show[n] that the asserted objective evidence is tied to . . . specific product[s] and [those] products ‘[are] the invention disclosed and claimed in the patent.’” *See WBIP, LLC*, 829 F.3d at 1329. This presumption is based solely on the stipulations of infringement by certain competitors, as Patent Owner has failed to provide persuasive evidence that serves as a basis for a nexus for its products or any other competitor products not covered by the stipulation of infringement.

Relying on the testimony of Dr. Stevick, Patent Owner asserts that its products “and competitor products practice the inventive aspects of the ‘394 [p]atent [c]laims.” PO Resp. 64 (citing Ex. 2129 ¶¶ 159–196 & Appx.). First, Patent Owner points out points out that certain competitors involved in the Texas Litigation admitted that their products infringed some of the Challenged Claims. PO Resp. 64; Ex. 2125, 2–4. Specifically, Patent Owner contends that “Intex and Bestway, the largest makers of airbeds sold in the U.S., admitted their products infringe the ‘394 Patent Claims.” PO Resp. 64 (citing Ex. 2125).²⁴ Second, Patent Owner argues that “Dr. Stevick analyzed the industry and found that in the market electric ‘built-in-pump’ airbeds with power inflation and deflation generally refer to products that practice the ‘394 [p]atent [c]laims.” *Id.* (citing Ex. 2129 ¶¶ 197–210). Patent Owner adds that “Dr. Stevick showed that the design showing

²⁴ We understand Patent Owner to have intended to cite to Exhibit 2125, as no Exhibit “2025” has been filed in this proceeding.

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secondary considerations specifically aligns with the claims of the ‘394 patent.” *Id.* Third, Patent Owner relies on Dr. Stevick’s testimony that its own products practice the Challenged Claims. *Id.*; see Ex. 2129 ¶¶ 159–196 & Appx. (containing analysis of Patent Owner’s products against the Challenged Claims).

Petitioners counter that Patent Owner is not entitled to a presumption of nexus in this case. Pet. Reply 22. Petitioners argue that Patent Owner’s declarant failed to fully analyze any of Patent Owner’s products against the Challenged Claims. *Id.* Petitioners add that they dispute infringement as to several of the Challenged Claims. *Id.* at 22–23. Petitioners also argue that Patent Owner’s nexus position relies on equating use of the phrase “built-in pump” in marketing material with falling within the scope of the Challenged Claims. *Id.* at 23.

As to the admission of infringement by certain competitors in the Texas Litigation, products from Airtek, Air Cloud, Air Comfort, AirBedz, Altimair, Pittman, and TexSport admittedly infringe claims 1–5, 7–12, 16–20, 22, and 23 (i.e., most, but not all, of the Challenged Claims) of the ‘394 patent. Ex. 2125, 2. Products from Intex, Bestway, and Boyd admittedly infringe claims 1–5, 7, 8, 10, and 12 of the ‘394 patent. *Id.* Because certain of Patent Owner’s objective evidence of nonobviousness is directed to these products, Patent Owner’s evidence in this regard demonstrates at least some showing of nexus.

We agree with Petitioners’ position that Dr. Stevick’s testimony fails to provide sufficient support that Patent Owner’s products practice any of the Challenged Claims. Pet. Reply 22. Specifically, we are not persuaded by the testimony of Dr. Stevick that:

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I have personally reviewed the pumps incorporated in [Patent Owner's] airbed models including the following built-in pumps: EZ V AC Dual Pump and EZ V Auto Shut Off Pump (collectively, "TWW Pumps").

I have determined that each of the TWW Pumps practice at least claims 1, 2, 3, 7, 8, 9, 10, 12, 16, 17, 18, 22, and 23 of the '394 [p]atent [c]laims and claims 4, 5, 6, 19, 20 and 21 to the extent that the PTAB adopts the claim construction of "pipe" asserted by Petitioners.

Ex. 2129 ¶ 159. Petitioners argue convincingly that Dr. Stevick fails to provide any persuasive support for this opinion covering both of the "TWW Pumps."²⁵ Pet. Reply 22. Based on our review of the complete record, including Dr. Stevick's testimony, we find that Dr. Stevick did not provide support that even one of Patent Owner's products practices any of the Challenged Claims. Dr. Stevick's analysis purports to compare Patent Owner's Insta-bed product number 840018, which uses the EZ V AC Dual Pump, with the Challenged Claims. Ex. 2129 ¶ 160. Our review of this testimony indicates that Dr. Stevick compared different claim limitations of claim 1 against different pumps. *Compare* Ex. 2129 ¶ 160 (including testimony about EZ V AC Dual pump), *with* ¶¶ 161, 163 (including testimony about EZ V Auto-Shutoff pump), *and with* ¶¶ 162, 164–167 (providing testimony about "each" of the two pumps, relying on what was "shown above," which was an image of the EZ V Auto-Shutoff pump only). Dr. Stevick does not provide any testimony about the similarities and

²⁵ Our review of the complete record did not provide us with any additional evidence to support this testimony, such as evidence in the record that packaging is marked with the '394 patent number or appropriate virtual marking. *See* 35 U.S.C. § 287(a).

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differences of these two pump models or why his analysis equally applies to both pumps and the Insta-bed product number 840018.

In the remainder of his testimony on how Patent Owner’s products allegedly practice the Challenged Claims, Dr. Stevick addresses the limitations of a challenged dependent claim and declares “[e]ach of the TWW Pump models satisfy” the limitation of the claim without providing any additional information demonstrating how either of the two pumps satisfy the limitation or lied on analysis of previous claims. *See* Ex. 2129 ¶¶ 168–188.

In summary, although Dr. Stevick did provide *an* analysis of each Challenged Claim with respect to certain TWW Pumps, we agree with Petitioners that he did not fully analyze any of Patent Owner’s products. *See* Reply 22. Accordingly, Patent Owner has not demonstrated that it is entitled to a presumption of nexus based on its own products practicing the Challenged Claims.

We also agree with Petitioners that Patent Owner is not entitled to a presumption of nexus based on alleged infringement that was disputed or based solely on a product having a “built-in pump.” Pet. Reply 23; *see* PO. Resp. 64. Dr. Stevick testifies that he “personally reviewed airbed models that account for at least the substantial majority of airbeds with electric built-in pumps (‘BIP’) in the marketplace, and they follow the design of [Patent Owner’s] ‘394 [p]atent [c]laims.” Ex. 2129 ¶ 196.

Dr. Stevick’s testimony about the airbeds he “personally reviewed” is entitled to little weight, as he does not provide any of the underlying analyses for his opinion (such as his analyses from the Texas Litigation), including which airbed models he reviewed or how the airbeds practiced any

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of the Challenged Claims of the '394 patent. *See* Ex. 2129 ¶¶ 196–198; 37 C.F.R. § 42.65(a).

Dr. Stevick testifies that “[m]anufacturers and retailers note the importance of a built-in electric pump that inflates and deflates in accordance with the ‘394 patent in their advertising.” Ex. 2129 ¶ 199. To support this opinion, Dr. Stevick references deposition testimony from corporate representatives from Bestway (USA) and Walmart. *Id.* Again, Dr. Stevick’s testimony is not persuasive. We have reviewed the referenced deposition testimony and find that it does not include any statements tying advertising to inflation and deflation as recited in the Challenged Claims. Similarly, as Petitioners argue, Patent Owner, does not provide persuasive evidence that supports his contention that any reference to an electric “built-in pump” that inflates and deflates indicates that the inflatable product practices one or more of the Challenged Claims. *See* Pet. Reply 23; Ex. 2129 ¶¶ 199–200.

In summary, based on the complete record, we determine that Patent Owner is entitled to a presumption of nexus with respect to certain Challenged Claims. This presumption is based solely on the stipulations of infringement by certain competitors in the Texas Litigation, as Patent Owner has failed to provide persuasive evidence that serves as a basis for a nexus for its products or any other competitor products not covered by the stipulation. *See* Ex. 2125, 2–4.

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We address Patent Owner’s arguments and evidence and Petitioners’ rebuttal arguments and evidence as to each specific indicium of nonobviousness, below.²⁶

Commercial Success

Having determined that there is at least some nexus, we consider Patent Owner’s arguments regarding the commercial success of the patented products. Patent Owner contends that “[s]ales of [REDACTED] of dollars of patented products proves ‘overwhelming’ commercial success.” PO Resp. 64–65 (citing an unpublished decision from the U.S. District Court for the Northern District of Texas). Patent Owner continues that “sales of the patented products by Walmart alone have exceeded [REDACTED].” *Id.* at 65 (citing Ex. 2638 ¶¶ 15, 42; Ex. 2129 ¶ 217) (emphasis omitted). Patent Owner contends that “[t]he market for infringing airbeds is a significant

²⁶ Patent Owner argues that “[t]he party asserting invalidity must overcome the presumption [of nexus] by *clearly and convincingly* proving secondary considerations are unrelated to the patented technology.” PO Resp. 64 (citing *WBIP, LLC*, 829 F.3d at 1329) (emphasis added). Patent Owner’s reliance on *WBIP* for this proposition is misplaced as that case involved district court litigation, where invalidity must be proved by clear and convincing evidence. *WBIP, LLC*, 829 F.3d at 1324; *see, e.g., Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1364 (Fed. Cir. 2018) (“A patent is presumed valid, and the burden of establishing invalidity of a claim rests on the party asserting invalidity by clear and convincing evidence.”). In an *inter partes* review proceeding, however, a petitioner must demonstrate, *by a preponderance of the evidence*, that a challenged claim is *unpatentable*. 35 U.S.C. § 316(e). Patent Owner provides no argument to support its proposition that Petitioners must overcome a presumption of nexus by clear and convincing evidence given the lower burden of proof for unpatentability in an *inter partes* review proceeding as compared to invalidity in a district court.

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portion of the overall airbed market and constitutes most airbed sales by revenue” and that “[t]he industry continues to grow, showing commercial success.” *Id.* (citing Ex. 2638 ¶ 46). Patent Owner argues that “[t]hese airbeds are sold due to the ‘394 patented design.” *Id.* (citing Ex. 2129 ¶¶ 202, 221).

Patent Owner also contends that “Petitioners and Real-Party-in-Interest Coleman’s own internal research shows” that inflation and deflation times are important to consumers. PO Resp. 65–66 (citing Ex. 2638 ¶¶ 53–58, 61–85; Ex. 2129 ¶¶ 205–224, 228, 252–263).²⁷ This research includes online interviews with individuals who have purchased airbeds within 12 months of the survey. *See, e.g.*, Ex. 2697, 2; Ex. 2698, 2, *cited in* Ex. 2638 ¶¶ 53–54.

Petitioners respond that unclaimed features, such as comfort and durability, contributed to any commercial success. Pet. Reply 23–24. Petitioners contend that these unclaimed features of airbeds are extensively

²⁷ Patent Owner notes that a protective order in the Texas Litigation was modified to allow “use of protected documents in the ‘pending IPRs—to the extent authorized by the Patent Trial and Appeal Board.” PO Resp. 65 n.13; *see also* Ex. 2731 (providing the modified protective order). Patent Owner adds that because “the modified district court protective order allows the use of [L]itigation discovery in Patent Owner’s possession to the extent the Board allows, in addition to documents the Board has ordered produced in discovery, Patent Owner’s expert declarations also address [e]xhibits . . . produced in the litigation for the Board’s consideration.” PO Resp. 65 n.13. Our analysis of Patent Owner’s contentions as to commercial success, including any of the declarants’ analyses that rely on the exhibits listed in footnote 13 of the Patent Owner Response, should in no way be construed as the Board authorizing Patent Owner to use these exhibits. The sole extent of any authorization from the Board to use confidential information from the Texas Litigation is presented in Paper 46.

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advertised and are consistently rated as more important to customers than a pump. *Id.* (citing Ex. 1649 ¶¶ 9–11, 19–39, ¶¶ 21–22 n.23–27, 66; Ex. 1625 ¶¶ 144–146; Ex. 1650 ¶¶ 8–19).

For example, Petitioners argue that comfort and durability are the most important features of an airbed to customers and that Patent Owner fails to address Petitioners’ evidence that supports their position that unclaimed features are responsible for the commercial success. Pet. Reply 24–25. Petitioners argue that Patent Owner “equate[s] ‘built-in pumps’ with any ‘premium’ products that generate higher revenue and profits, including raised height airbeds.” *Id.* at 25 (citing Ex. 1649 ¶¶ 40–44, 66–69, 72). Petitioners contend that, contrary to this position, “the evidence demonstrates that numerous product features create ‘premium’ airbed products.” *Id.* (citing Ex. 1649 ¶¶ 40–44, 66–69, 72; Ex. 1670, 90, 91, 201, 202).

Petitioners also argue that Patent Owner did not “address whether market share was impacted when the claimed features were introduced to the market.” Pet. Reply 25. Petitioners argue that Intex’s growth in sales on which Patent Owner relies “is tied directly to Intex’s patented, comfort- and durability-focused Dura-Beam® product line—which is completely unrelated to the Challenged Claims.” *Id.* (citing Ex. 1649 ¶¶ 55–57, Schedules 2–4; Ex. 1650 ¶¶ 8–22; Exs. 1651, 1652, 1654).

Finally, Petitioners argue that “the vast majority of airbeds purchased by consumers do not have a ‘built-in pump’ (referred to by [Patent Owner] as ‘NBIP’ sales), further demonstrating that a ‘built-in pump’ (whether covered by the Challenged Claims or not) is not important to the majority of consumers.” Pet. Reply 26 (citing Ex. 1649 ¶¶ 45–54, 57).

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In reply, Patent Owner argues that “Petitioners do not provide any credible economic evidence or analysis to support their assertion that unclaimed features create commercial success.” PO Surreply 22. Patent Owner contends that the unclaimed features “Petitioners mention are available in BIP airbeds that practice the claims and NBIP airbeds. Dr. Becker considered these other airbed features in his analysis.” *Id.* (citing Ex. 1648, 243:16–245:12). Patent Owner continues that “the data that Dr. Becker considered for [REDACTED] at Walmart accounts for these other features which are found in both BIP and NBIP airbeds.” *Id.* at 22–23. Patent Owner also replies that Petitioners’ arguments concerning market share and units sold are unavailing. *Id.* at 23. Patent Owner asserts that Petitioners’ admittedly infringing products amounts to approximately [REDACTED] dollars in sales. *Id.* at 18 (citing Ex. 1648, 69:8–24, 143:4–13).

In evaluating Patent Owner’s sales information *alone*, we recognize that Patent Owner shows the commercial success of certain airbeds that fall within the scope of some of the Challenged Claims based on the large revenues (approximately [REDACTED]) generated by sales of these certain airbeds. As we explain in greater detail in our analysis below, we find that the nexus between these sales and the claimed product features, however, is weak. Accordingly, the overall weight we attribute to the objective evidence of commercial success is not considerable.

First, as we explained above, the presumed nexus is associated with only those products for which Petitioners (and other defendants in the Texas Litigation) admit infringement. Second, based on our review of the complete record, we find that unclaimed features of the sold airbeds contribute, at least in part, to the commercial success of these airbeds, which

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further weakens the nexus and discounts the overall weight given to this objective evidence. *See* Reply 24–25. As Petitioners note, customer survey data, which indicate why a customer purchases an airbed, counter Patent Owner’s contentions. *See id.* at 24–25; *see, e.g.*, Ex. 2694 (providing research on the purchasing process of airbed customers), *cited at* Pet. Reply 24. For example, customer research shows that [REDACTED]

[REDACTED] Ex. 2694, 6; *see also id.* at 7 [REDACTED]
[REDACTED] This research shows that comfort and durability outranks a built-in pump²⁸ in a listing of most important features. *See id.* at 10, 11.

Other record evidence also supports this finding. For example, Coleman customer research shows that, in addition to built-in pumps, which were “highly valued” (e.g., [REDACTED]
[REDACTED]
[REDACTED] Ex. 2692, 20, 22, 25; *see also* Ex. 2644, 15 (indicating that the most important features are comfort, durability, and not leaking air); Ex. 2696, 8 (indicating that airbed efficacy, including durability and comfort, is more important in brand preference than advanced pump features, including the pump being built into

²⁸ We note that Coleman, the source of this information, disputes that any of its airbeds infringe the ’394 patent and, as we indicate in our analysis of nexus, the evidence of record does not demonstrate that any Coleman airbed falls within the scope of any Challenged Claims. *See* Ex. 2125, 3. Coleman’s use of the term “build in pump” in this survey analysis serves to illustrate that the term is not necessarily an analog for practicing the claims of the ’394 patent.

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the mattress); Ex. 2697, 20 (indicating that customers would be willing to pay more for durability).²⁹ Our review of the totality of the evidence shows that features related to comfort and durability, as well as the type of pump, are considerations that contribute more significantly to the sales of airbeds at Walmart than a built-in pump.

We recognize that some of the evidence of record supports the position that customers are concerned with inflation or deflation times. *See, e.g.,* Ex. 2692, 25 [REDACTED] [REDACTED]). This evidence does not effectively strengthen the nexus between the Challenged Claims and commercial success. Patent Owner does not direct us to persuasive evidence that this customer concern directly translates into a preference for airbeds that are covered by the Challenged Claims. Although a capability to do power inflation and deflation would address this concern, Patent Owner does not direct us to persuasive evidence linking a limitation recited in the '394 patent to decreased inflation or deflation times as compared to the prior art.

As Petitioners argue, Dr. Becker's testimony also supports our finding. Pet. Reply 24. For example, Dr. Becker testifies, "I would agree that . . . comfort and durability are important characteristics in consumer demand." Ex. 1648, 34:19–21. Dr. Becker further testifies that "[e]very manufacturer that I've reviewed in describing their products describes a number of different differentiating features of those products, not unlike what" Patent Owner did in terms of comfort and durability. *Id.* at 100:20–

²⁹ These exhibits were cited by declarants' analyses. *See* Ex. 1625 ¶ 146; Ex. 1649 ¶¶ 21, 26–29, 39, 62, 67; Ex. 2129 ¶¶ 252–254, 258; Ex. 2638 ¶¶ 53, 55.

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101:6. Dr. Stevick testifies consistent with this finding as well. *See*

Ex. 1635, 372:3–14 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

We are persuaded by Petitioners’ argument that, between 2011 and 2018, Walmart sold more airbeds without built-in pumps as compared to airbeds with built-in pumps supports a finding that, when making an airbed purchase, customers consider factors *other than* whether the airbed has a built-in pump that will power inflate/deflate with a movable air conduit, as claimed in the Challenged Claims. Pet. Reply 26; Ex. 1649 ¶ 52. In this time period, [REDACTED] of airbed sales at Walmart were for airbeds without built-in pumps and sales for airbeds without built-in pumps had similar profit percentages as sales for airbeds with built-in pumps. *See* Ex. 1649 ¶ 52. This [REDACTED] ratio, on a per unit basis, supports an inference that customers’ purchases are driven, at least in part, by factors other than whether an airbed has a built-in pump with a movable air conduit, as recited in the Challenged Claims.

Finally, our finding of limited commercial success is consistent with the decision in binding arbitration between Petitioners and Patent Owner involving the ’394 patent (and other patents). In that proceeding, the arbitrator, in determining a royalty rate for future airbed sales, [REDACTED]
[REDACTED]
[REDACTED]

Ex. 2765, 11.

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At the same time, we are not persuaded by Petitioners’ argument that the increase in sales of Intex airbeds that included built-in pumps was attributable to its introduction of the DURA-BEAM[®] product line. *See* Pet. Reply 25. Petitioners rely on declaration testimony from Mr. Schoettelkotte, their declarant with respect to economic analyses, and Mr. Slate, Intex’s Director of Sales, both of which reference data from Exhibits 1651 and 1652. *See* Ex. 1649 ¶¶ 55–57; Ex. 1650 ¶ 22. We cannot discern, without additional analysis from Petitioners or their declarants, how these data support Petitioners’ contention.³⁰

Third, we discount slightly the weight of this objective evidence because Patent Owner’s commercial success assertion includes a single retailer—Walmart—without any explanation as to the significance of the sales of this single retailer to the entire market. *See* PO Resp. 64–66. Although Patent Owner contends that infringing airbeds make up “a significant portion of the overall airbed market and constitutes most airbed sales by revenue,” this contention is unsupported. *See id.* at 65 (citing Ex. 2638 ¶ 46). Dr. Becker’s declaration, at paragraph 46, likewise addresses Walmart sales only, not the “overall airbed market.” *See* Ex. 2638 ¶ 46. As such, although we recognize that the amount of revenue from the Walmart sales is considerable and entitled to some weight, that evidence is limited by the lack of overall market share data cuts against the Walmart sales data. *See, e.g., Tec Air, Inc. v. Denso Mfg. Michigan Inc.*, 192 F.3d 1353, 1360–61 (Fed. Cir. 1999) (“Based on Tec Air’s sales evidence [of millions of

³⁰ At oral hearing, Petitioners presented an analysis of their sales data to support their contention, which showed sales trends. *See* Tr. 122:20–24. That analysis, however, does not appear in Petitioners’ Reply.

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products sold], the jury reasonably could have found that the invention enjoyed commercial success. Denso argues that this evidence is insufficient because Tec Air failed to provide market share data. Although sales figures coupled with market data provide stronger evidence of commercial success, sales figures alone are also evidence of commercial success.”); *cf. In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996) (“This court has noted in the past that evidence related solely to the number of units sold provides a very weak showing of commercial success, if any.”).

We are persuaded, based on the complete record, that there is not a strong nexus between the revenue value for infringing products sold at Walmart and the patented invention. We find that the strength of any nexus is offset by the evidence of record concerning the impact of non-patented features on customer demand. In conclusion, we find that Patent Owner is entitled to some, but not considerable, weight with respect to the objective evidence of commercial success.

Copying

We also consider the fact that a competitor who copies technology suggests it would not have been obvious. *See Windsurfing Int’l, Inc. v. AMF, Inc.*, 782 F.2d 995, 1000 (Fed. Cir. 1986) (“[C]opying the claimed invention, rather than one within the public domain, is indicative of non-obviousness.”).

Our [reviewing court’s] case law holds that copying requires evidence of efforts to replicate a specific product, which may be demonstrated through internal company documents, direct evidence such as disassembling a patented prototype, photographing its features, and using the photograph as a blueprint to build a replica, or access to the patented product combined with substantial similarity to the patented product.

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Wyers v. Master Lock Co., 616 F.3d 1231, 1246 (Fed. Cir. 2010). Patent Owner contends that “[a]s admitted by Petitioners, Bestway, for example, copied the prevalent design for power inflate/deflate airbeds in the market starting in approximately 2010.” PO Resp. 66 (citing Ex. 2129 ¶¶ 197, 199, 211, 241). Patent Owner adds that “[t]he products in the market look nothing like the prior art asserted in this IPR—they follow [Patent Owner’s] ’394 patented design.” *Id.* (citing Ex. 2129 ¶¶ 223–225; Exs. 2682–86).

We determine that Patent Owner’s evidence of copying is entitled to no weight, as Patent Owner fails to offer any evidence of copying. First, Patent Owner does not direct us to any admission by a competitor that it copied one of Patent Owner’s products embodying any of the Challenged Claims of the ’394 patent. *See Wyers*, 616 F.3d at 1246 (“[C]opying requires evidence of efforts to replicate a specific product.”). None of the paragraphs in Dr. Stevick’s declaration highlighted by Patent Owner discusses copying. Indeed, Dr. Stevick does not have a subsection of his declaration directed to copying. *See* Ex. 2129 ¶¶ 149–272 (providing testimony on secondary considerations, but not testifying as to copying).

Moreover, Dr. Stevick’s testimony at paragraph 223 to 225, cited by Patent Owner, is not directed to whether a competitor’s products look like the prior art, as Patent Owner indicates. *See* Ex. 2129 ¶¶ 223–225 (discussing alleged commercial success).

Failure to Develop Alternatives

Consideration of objective evidence of nonobviousness also includes “the failure of others to produce alternatives to the patented invention.” *GPAC Inc.*, 57 F.3d at 1580. As with other objective evidence, this evidence must demonstrate that any “inability or unwillingness of competitors” to

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develop alternative products “is rooted in the subject matter” of the Challenged Claims. *See id.* Patent Owner contends that Petitioners “attempted to design around the ’394 [p]atent but failed—they knew consumers would not accept a design without a permanently built in pump that followed the ’394 [p]atent [c]laims.” PO Resp. 68 (citing Ex. 2129 ¶¶ 240–246, App.).

In support of this contention, Patent Owner relies on Dr. Stevick’s testimony about Intex’s 619B and 619C pumps, which Intex developed as alternatives to its admittedly infringing pump. PO Resp. 68; Ex. 2129 ¶ 245. Dr. Stevick includes an analysis on how the 619C pump, as part of an airbed, would fall within the scope of claims 1–4, 6–12, 16–19, and 21–23 of the ’394 patent. *See* Ex. 2129, App. Dr. Stevick further states that Petitioners did not develop any alternative similar to the products described in the prior art and asserted in this proceeding. *Id.* ¶ 245.³¹

Petitioners respond that they developed noninfringing alternatives to a built-in pump as claimed in the Challenged Claims, and customers immediately purchased the products. Pet. Reply 26. As noted above, however, Dr. Stevick testifies that those alternative designs infringe each of the Challenged Claims and, [REDACTED]

[REDACTED]

³¹ Dr. Stevick also testifies that “[e]ven 17 years after the patent was filed, in the face of litigation with the prospect of damages and possibly an injunction against their products, the market’s biggest companies . . . were unable to avoid the patent claims despite three different attempts to develop alternatives.” Ex. 2129 ¶ 246. We do not consider this statement at all, as it constitutes argument that should have been included in the Patent Owner Response. *See* Paper 75, 5.

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[REDACTED]

See Tr. 107:10–20; Ex. 2765, 14–16.

Patent Owner also states that “for many years” competitors offered airbeds that fell within the scope of the ’394 patent claims, and would not use alternatives, relying on paragraphs 240 to 246 of Dr. Stevick’s declaration. PO Resp. 66. Although some of these paragraphs are directed to the litigious nature of the field and an alternative design introduced by Petitioners after being sued for infringement, they do not show that the inability or unwillingness to develop alternatives was rooted in the subject matter of the Challenged Claims. *See* Ex. 2129 ¶¶ 240–246.

We determine that this objective evidence is entitled to some weight. The record indicates that Petitioners [REDACTED]

[REDACTED] *See* Ex. 2129 ¶ 245, App.; Ex. 2765, 14–16. We note, however, contrary to Patent Owner’s assertion, that Patent Owner does not offer any direct evidence that Petitioners “knew consumers would not accept a design without a permanently built in pump.” PO Resp. 68. Although Patent Owner’s contention is not directly supported, we find, based on our review of the complete record, that Petitioners had an incentive to design around the ’394 patent and attempted to do so by making a minimal change to their designs, which supports at least an inference that customers would not have accepted a drastically different design. *See* Ex. 2129 ¶ 245; Ex. 2765, 14–16; *see also* Ex. 2634, Articles 5, 6 [REDACTED]

[REDACTED]

[REDACTED]

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The significance of this failure is tempered by the fact that the [REDACTED]

[REDACTED]

[REDACTED] Accordingly, we find that there is limited nexus between this objective evidence and the limitations of the '394 patent.

Broad Acceptance, Praise, and Licensing

Industry acceptance of an invention may also provide an objective indicium of nonobviousness. *See Allen Archery, Inc. v. Browning Mfg. Co.*, 819 F.2d 1087, 1092 (Fed. Cir. 1987) (considering copying, praise, unexpected results, and industry acceptance as indicators of nonobviousness). Also, evidence that the industry praised a claimed invention or a product that embodies the patent claims weighs against an assertion that the same claim would have been obvious. *WBIP, LLC*, 829 F.3d at 1334. Praise from industry participants, especially competitors, is probative as to nonobviousness because such participants “are not likely to praise an obvious advance over the known art. Thus, if there is evidence of industry praise of the claimed invention in the record, it weighs in favor of the nonobviousness of the claimed invention.” *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1053 (Fed. Cir. 2016). Finally, “[l]icenses taken under the patent in suit may constitute evidence of nonobviousness; however, only little weight can be attributed to such evidence if the patentee does not

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demonstrate ‘a nexus between the merits of the invention and the licenses of record.’” *GPAC Inc.*, 57 F.3d at 1580 (quoting *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1539 (Fed. Cir. 1983)).

Patent Owner contends that its “patented products launched an entire category of ‘built-in pump’ airbeds.” PO Resp. 68–69 (citing Ex. 2638 ¶¶ 15, 16, 44–53). Patent Owner also contends that “Petitioners’ own witnesses testified about the value of the ’394 patented invention, an admission of non-obviousness.” *Id.* at 69 (citing Ex. 2638 ¶ 46; Ex. 2129 ¶¶ 221, 228–234, 262, 263). Patent Owner adds that the sales figures show “broad consumer acceptance.” *Id.* Patent Owner continues that “[c]ompanies specifically tout the patented technology in their advertisements, including box art and photos highlighting the patented design.” *Id.* (citing Ex. 2129 ¶¶ 199, 222–225; Exs. 2653, 2680–2687). Patent Owner also contends that its “patents in the pending [*inter partes* review proceedings] including the ’394 patent also have obtained more than [REDACTED] dollars in licensing.” PO Resp. 69 (citing Ex. 2638 ¶¶ 49–52; Ex. 2129 ¶ 264).

Petitioners respond that Patent Owner “points to no evidence that any licensing or alleged industry praise is the *direct* result of any claimed feature” (citing Ex. 1649 ¶¶ 61, 73–78) (emphasis added) and that “[t]he parties’ settlement agreement should be given no weight” (citing *Bosch Auto. Serv. Sols., LLC v. Matal*, 878 F.3d 1027, 1038 (Fed. Cir. 2017)). Pet. Reply 26–27.

We find that this objective evidence is entitled to little weight. With respect to Patent Owner’s contention that the invention of the ’394 patent launched an entire category of airbeds, the evidence of record does not

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support the contention. Although Patent Owner directs us to paragraphs 15, 16, and 44 to 53 in Dr. Becker’s declaration, we do not discern, and Patent Owner does not adequately explain, how this testimony supports the contention that the ’394 patent launched an entire category of airbeds. *See* PO Resp. 68–69; Ex. 2638 ¶¶ 15–16 (discussing Walmart products and sales), 44–53 (discussing Walmart sales and licensing).

As to Patent Owner’s contention that Petitioners’ witnesses testified about the value of the ’394 patented invention (PO Resp. 68–69), we afford this assertion no weight, as it is not supported by record evidence or improperly incorporates by reference argument from a declarant. To support its contention, Patent Owner references a large number of paragraphs from its declarants’ testimony—paragraph 46 of Dr. Becker’s declaration and paragraphs 221, 228 to 234, 262, and 263 of Dr. Stevick’s declaration—but provides no further explanation. *See* PO Resp. 69 (referencing Ex. 2638 ¶ 46; Ex. 2129 ¶¶ 221, 228–234, 262, 263); Ex. 2638 ¶ 46; Ex. 2129 ¶¶ 221, 228–234, 262, 263. Based on our review of the referenced evidence, we find that it does not support Patent Owner’s contention

Patent Owner also contends that “[c]ompanies specifically tout the patented technology in their advertisements, including box art and photos highlighting the patented design,” to support its position that the large sales experienced by their product was due to the patented technology. *See* PO Resp. 69 (citing Ex. 2129 ¶¶ 199, 222–225; Exs. 2653, 2680–2687). The evidence relied on by Patent Owner is directed to the term “built-in pump” generally. Although inflation and deflation are mentioned in some of this evidence, Patent Owner fails to explain adequately how these references are tied to features recited in the Challenged Claims, such as the movable air

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conduit. Because Patent Owner’s argument is unsupported by the evidence of record, it is not given any weight. PO Resp. 69 (citing Ex. 2129 ¶¶ 199, 222–225; Exs. 2653, 2680–2687).

Patent Owner’s evidence of large sales merely attempts to repackage commercial success as a different indicium of nonobviousness—broad acceptance by consumers. We address commercial success in its own subsection, above.

Finally, we give little weight to the settlement agreement in the context of this indicium. Patent litigation provides risk and uncertainty for a party and settlement represents a way to reduce that risk and uncertainty, independent of any value the parties place on the patented invention. *See Bosch Auto.*, 878 F.3d at 1038 (Fed. Cir. 2017) (“[L]icensing, without more, is generally not a strong indication of nonobviousness if it cannot also be shown that the licensees did so out of respect for the patent rather than to avoid litigation expense.”). Here, Patent Owner fails to explain adequately how respect for the Challenged Claims, rather than avoiding litigation’s expense and risk, led to the settlement agreement.

In conclusion, we give the objective evidence associated with the indicia of nonobviousness for broad acceptance, industry praise, and licensing little weight.

Long-felt Need

Evidence of a long-felt but unsolved need tends to show nonobviousness because it is reasonable to infer that the need would have not persisted had the solution been obvious; however, “[a]bsent a showing of long-felt need or the failure of others, the mere passage of time without the

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claimed invention is not evidence of nonobviousness.” *See Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004).

Patent Owner contends that “[f]or decades the airbed industry sought after goals finally solved by the ‘394 patent, *i.e.*, recessed pump, holding air, not overheating efficiently enabling powered inflation and deflation in a short amount of time without undue size, noise, or expense” but no one “created a working, commercially viable product before Mr. Wang’s invention.” PO Resp. 69 (citing Ex. 2129 ¶¶ 236–239). Patent Owner adds, without further explanation, that “Petitioners’ own asserted motivations to combine are further proof that there was a need, but it was not met until the ‘394 patent.” *Id.* at 69–70.

Petitioners respond that Patent Owner’s declarant identifies the alleged long-felt need as “customer convenience,” which differs from the need identified in the Patent Owner Response and which was satisfied in the prior art. Pet. Reply 27.

We afford this objective evidence little weight. Patent Owner offers no persuasive evidence of a long-felt need for an inflatable product with a recessed pump that holds air and does not overheat, efficiently enabling powered inflation and deflation in a short amount of time, without undue size, noise, or expense. Our review of the cited paragraphs of Dr. Stevick’s testimony reveals that it merely describes prior art systems that differ from the Challenged Claims. *See, e.g.*, Ex. 2129 ¶¶ 236–239. Dr. Stevick’s testimony does not direct us to any evidence of Patent Owner’s stated long-felt need or that others attempted to satisfy that need and failed. Indeed, as Petitioners point out, Dr. Stevick’s testimony seems to be directed to an alleged long-term need for “consumer convenience related to the pump.”

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See Pet. Reply 27; Ex. 2129 ¶ 236 (“[T]here was a long-felt need for consumer convenience related to the pump.”). We are persuaded by Petitioners’ argument that Dr. Stevick does not offer any evidence that even this alleged need existed. Pet. Reply 27.

For example, Dr. Stevick alleges that “[t]he problem persisted for over 100 years before” Mr. Wang (the named inventor of the ’394 patent) solved the problem, but Dr. Stevick’s testimony provides no evidentiary support that any problem existed. *See* Ex. 2129 ¶ 237. Although Dr. Stevick testifies that others failed, his testimony does not adequately explain why the previous designs did not provide customer convenience (the problem his testimony is directed to) or that the prior art solutions discussed even attempted to solve the problem of customer convenience. *See id.* Instead, Dr. Stevick’s testimony merely recounts the passage of time until the filing of the application that matured into the ’394 patent. *See id.*

In conclusion, we give the objective evidence associated with long-felt need little weight.

Skepticism of Others

“Evidence of industry skepticism weighs in favor of non-obviousness. If industry participants or skilled artisans are skeptical about whether or how a problem could be solved or the workability of the claimed solution, it favors non-obviousness.” *WBIP, LLC*, 829 F.3d at 1335. Patent Owner contends that “[c]onventional wisdom taught away from the ’394 patented design.” PO Resp. 70 (citing Ex. 2129 ¶¶ 265–270). Patent Owner argues that advantages of detachable pumps include that they work with multiple beds, result in smaller deflated beds, have lower costs, have higher efficiencies, and avoid overheating. *Id.* Patent Owner argues that these

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concerns weigh against a built-in pump design and, despite these concerns, Mr. Wang invented the claimed technology. *Id.*

We afford objective evidence of this indicium very little weight. First, even if we take the asserted disadvantages as true, such statements do not necessarily amount to credible evidence of industry skepticism or even arise to the level of teaching away from the Challenged Claims. Moreover, Patent Owner does not direct us to any persuasive evidence that the inflatable product industry was skeptical that a built-in pump with a movable air conduit could effectively be used with an inflatable product, such as an airbed.

Second, we afford Dr. Stevick’s testimony with respect to industry skepticism very little weight. Ex. 2129 ¶¶ 265–267. We find nothing in Dr. Stevick’s testimony in the cited paragraphs that directly addresses industry skepticism or teaching away from the Challenged Claims. Instead, this testimony merely identifies differences between the claimed inflatable product of the ’394 patent and prior art inflatable products. *See, e.g.,* Ex. 2129 ¶¶ 265–267. Novelty over certain prior art does not equate to industry skepticism or an industry teaching away from a certain solution.

Paragraphs 268 and 269 of Dr. Stevick’s testimony allegedly recount conversations between Mr. Wang and his son, a general manager for Patent Owner. As Petitioners persuasively point out, we have no documentation of these conversations or any other corroborating evidence and, to the extent that Dr. Stevick accurately characterizes the conversations, the interests of these parties in the outcome of this proceeding causes us to greatly discount their unsworn statements. *See* Pet. Reply 27 (arguing that Patent Owner “relies on uncorroborated, biased conversations its experts had with the

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named inventor and no other relevant evidence”). In conclusion, we give the objective evidence associated with skepticism of others very little weight.

Summary

Weighing all of the objective evidence, we determine, on the complete record, that Patent Owner is entitled to some, but not considerable, weight in favor of nonobviousness.

(9) Conclusion

For the reasons discussed above (§§ II.C.3.a.1–7), the evidence presented by Petitioners strongly indicates that claim 1 would have been obvious over Walker and Chaffee. For the reasons also discussed above (§ II.C.3.a.8), Patent Owner’s objective evidence weighs only slightly in favor of nonobviousness. When considering all of the evidence of obviousness and nonobviousness together (*see In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1079 (Fed. Cir. 2012)), we find Petitioners’ strong evidence of obviousness outweighs Patent Owner’s objective evidence of nonobviousness. Thus, we conclude Petitioners have demonstrated by a preponderance of the evidence that claim 1 would have been obvious over Walker and Chaffee.

b. Dependent Claims 2 and 3

Claim 2 depends from claim 1, and recites “wherein air flows from the interior region of the housing into the inflatable body when the air conduit is in the first position.” Ex. 1101, 8:40–42. Claim 3 depends from claim 1, and recites “wherein air flows from the inflatable body into the interior region of the housing when the air conduit is moved to the second position.” *Id.* at 8:43–46. Petitioners state that Walker discloses the

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additional limitations in these claims. Pet. 57 (discussing Ex. 1102 ¶¶ 225–228).

Referring to the discussion in the Petition of the “built into” limitation, the “interior region” limitation, and the “air conduit” limitation, Petitioners state that (1) “air flows from the interior region of casing 328—in which gate 338, motor 344, and impeller 348 are housed—to air mattress 319 when gate 338 (the air conduit) is in its first, inflating position, as required by Claim 2” and (2) “air flows from air mattress 319 to the interior region of casing 328 during deflation, as required by Claim 3.” Pet. 57 (citing Ex. 1101 ¶¶ 225, 227; Ex. 1110 12:27–38; Pet. 35–55).

The record evidence, summarized above, supports Petitioners’ position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Walker discloses the limitations in claims 2 and 3. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 2 and 3 would have been obvious based on Walker and Chaffee.

c. Dependent Claim 4

Claim 4 depends from claim 1, and recites “wherein the air conduit is a pipe.” Ex. 1101, 8:47–48. Petitioners state that, even under the construction of “pipe” above—i.e., “a tubular or cylindrical object, part, or passage”—“Walker’s gate 338 . . . constitutes a pipe.” Pet. 59 (citing Ex. 1102 ¶ 231). According to Petitioners, one of ordinary skill in the art “would have appreciated that pipes come[] in all shapes (e.g., square and rectangular) and sizes (e.g., long and short)” and “[g]ate 338 is merely a

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short, rectangular tube with two passages (openings 357 and 358).” *Id.* (citing Ex. 1102 ¶ 231).

Patent Owner asserts that Walker and Chaffee do not teach or suggest that the “air conduit” is a “pipe.” PO Resp. 39. According to Patent Owner, “Walker’s ‘flat rectangular shaped gate’ [338] should not be interpreted to be a ‘pipe.’” PO Surreply 8–9. For the reasons provided below, we determine that Petitioners have not adequately demonstrated that one of ordinary skill in the art would have understood gate 338 in Walker to be a “pipe” under the construction above. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378–79 (Fed. Cir. 2015) (“In an *inter partes* review, the burden of persuasion is on the petitioner to prove ‘unpatentability by a preponderance of the evidence,’ 35 U.S.C. § 316(e), and that burden never shifts to the patentee.”).

Walker describes gate 338 as “a flat rectangular shaped gate . . . having rectangular openings 357 and 358.” Ex. 1110, 12:22–25 (discussing Fig. 25); *see supra* p. 45 (providing Petitioners’ annotated version of Figure 25 of Walker, showing gate 338 overlaid in orange). Here, Petitioners identify the entirety of gate 338—including *both* openings 357 and 358—as the “pipe.” As evidence of this, in response to Patent Owner’s argument that one of ordinary skill in the art “would not consider an aperture (‘opening’) in a flat plate (such as that of sliding gate 338), to be a ‘pipe’ (i.e., ‘a tubular or cylindrical object, part, or passage)’” (PO Resp. 39–40), Petitioners clarify: “It is not, however, gate openings 357 and 358 (the apertures) that Petitioners contend constitute the claimed ‘pipe’ but the gate 338 itself—as gate 338 is a short, rectangular tube *with two passages* (openings 357 and 358) and, thus, constitutes a ‘pipe.’” Pet. Reply 11

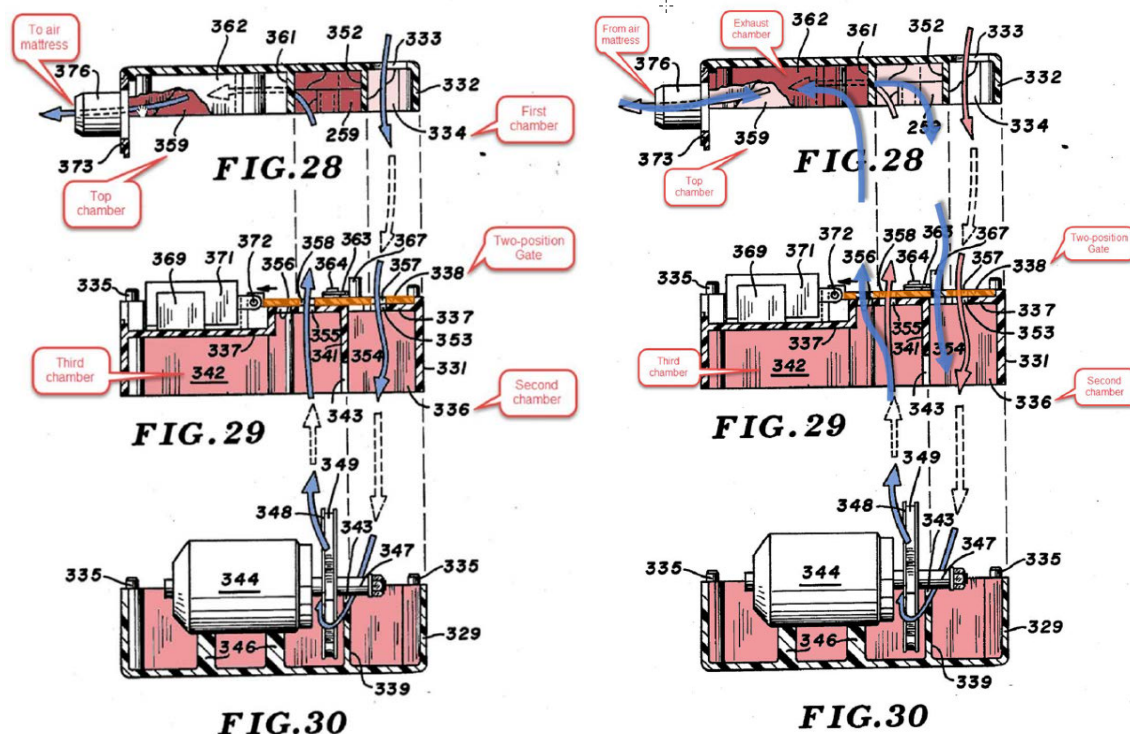
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(emphasis added) (citing Ex. 1625 ¶¶ 59–61; Ex. 1602, 479:2–16; Ex. 1635, 506:4–15, 513:22–24); *see* Ex. 1102 ¶ 231 (stating that “even if the Board were to construe the term pipe to mean a tubular or cylindrical object, part, or passage, a POSA would have understood gate 338 to constitute a pipe, as it is a short, rectangular tube with two passages (openings 357 and 358)”); *see also* Tr. 76:10–12 (counsel for Patent Owner stating that Petitioners are calling gate 338 “a divided pipe”).

As discussed above (*see supra* § II.C.3.a.5), in *both* the inflation configuration and the deflation configuration of the device in Walker, air flows through openings 357 and 358 in different directions—“down” through opening 357 and “up” through opening 358. Below, we again reproduce Petitioners’ annotated versions of Figures 28–30 of Walker (as provided above), with the inflation configuration on the left and the deflation configuration on the right.



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Pet. 47, 52. Figures 28–30 show sectional views at different locations within the air control apparatus. Ex. 1110, 4:35–40. As shown in these figures, no structure *that is part of gate 338*—i.e., the identified “pipe”—conveys air from outlet of opening 357 to intake of opening 358. Even viewing “pipe” in the broadest sense of the construction above (as a “tubular . . . object” (*see supra* p. 22)), a “pipe” requires *structure*—which is the “pipe” *itself*—that can convey fluid from the inlet(s) of the “pipe” to the outlet(s).³² This understanding is supported by this passage in the ’394 patent, which describes the function of exemplary pipe 32 when the product is deflating:

The air in the inflatable product is evacuated by the fan and motor 33. The path of the airflow is indicated by arrows. *Air flows through the air intake 314, the switching pipe 32 and the air intake 311, and into the housing 31. Then, air flows out from the air outlet 312.*

Ex. 1101, 4:33–38 (emphasis added) (describing Figures 3C and 3D).

Figures 3C and 3D are reproduced below:

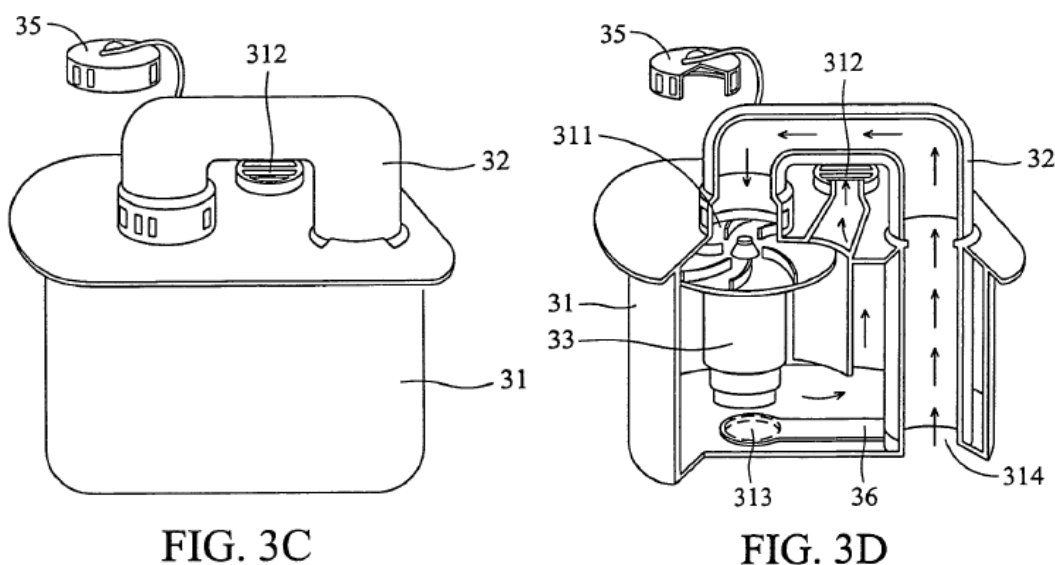


FIG. 3C

FIG. 3D

³² See Ex. 1602, 479:9–16 (Dr. Stevick testifying that “pipe” is not restricted to “one passageway”).

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Figure 3C depicts an air pump of an embodiment of an inflatable product during deflation. *See id.* at 2:3–4. Figure 3D depicts the air pump of Figure 3C with portions of certain structures removed. *See id.* at 2:5–6. Our understanding is also supported by extrinsic evidence, which makes clear that a “pipe” (like a “tube”) is the *structure* used to convey. *See, e.g., McGraw-Hill Dictionary of Scientific and Technical Terms* 1602 (Elizabeth Geller ed., 6th ed. 2003) (defining “pipe” as “[a] tube . . . used to conduct a fluid, gas, or finely divided solid”), 2200 (defining “tube” as “[a] long cylindrical *body* with a center used especially to convey fluid” (emphasis added)); *see also* Pet. 23 (proposing to construe “pipe” as “a hollow body for conveying air or other gases”).

In contrast, Petitioners direct us to *no structure* that is part of the identified “pipe”—i.e., gate 338—that conveys the air from the outlet of opening 357 to the inlet of opening 358 along the pathways indicated in the annotated versions of Figures 28–30 above. Pet. 58–59; *see supra* p. 89. Instead, *other structures* (not part of gate 338) convey the air along those pathways. *See supra* p. 89. For these reasons, Petitioners have not shown sufficiently that Walker’s gate 338 (as relied upon) is a “pipe.” Nor do Petitioners rely on Chaffee to satisfy this claim limitation. Accordingly, we determine, based on the complete record, that Petitioners have not demonstrated by a preponderance of the evidence that claim 4 would have been obvious based on Walker and Chaffee.

d. Dependent Claim 6

Claim 6 depends from claim 4. *See* Ex. 1101, 8:51–52. For the reasons discussed above as to claim 4 in the context of this asserted ground, we determine, based on the complete record, that Petitioners have not

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demonstrated by a preponderance of the evidence that claim 6 would have been obvious based on Walker and Chaffee.

e. Dependent Claim 7

Claim 7 depends from claim 1, and recites “wherein the air conduit is arranged to convey air pumped by the fan and motor assembly.” Ex. 1101, 8:53–55. Petitioners contend that “Walker disclosed that its air conduit (gate member 338) is arranged to convey air pumped by Walker’s fan and motor, as required by Claim 7.” Pet. 60 (citing Ex. 1102 ¶¶ 233–235). Referring to the discussion in the Petition of the “air conduit” limitation and the “wherein” limitation,” Petitioners state that “gate 338 (the air conduit) conveys air that is pumped by the impeller 348 and motor 344 (the fan and motor assembly) through openings 357, 358 when gate 338 is in the first and second positions.” *Id.* (citing Ex. 1110, 3:5–8, 12:24–38, 13:6–12, Figs. 28–30; Ex. 1102 ¶¶ 233–235).

The record evidence, summarized above, supports Petitioners’ position as to the limitation in this claim, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Walker discloses the limitation in claim 7. Patent Owner does not present arguments addressing this claim. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claim 7 would have been obvious based on Walker and Chaffee.

f. Dependent Claims 8 and 9

Claim 8 depends from claim 7, and recites “wherein the air conduit has a first end and a second end, and wherein the fan and motor assembly causes air to be conveyed from the first end of the air conduit to the second

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end of the air conduit when the air conduit is in the first position.” Ex. 1101, 8:56–60. Claim 9 depends from claim 8, and recites “wherein the fan and motor assembly causes air to be conveyed in sequence from ambient, through the first end of the air conduit, to the second end of the air conduit, and into the inflatable body when the air conduit is in the first position.” *Id.* at 8:61–65.

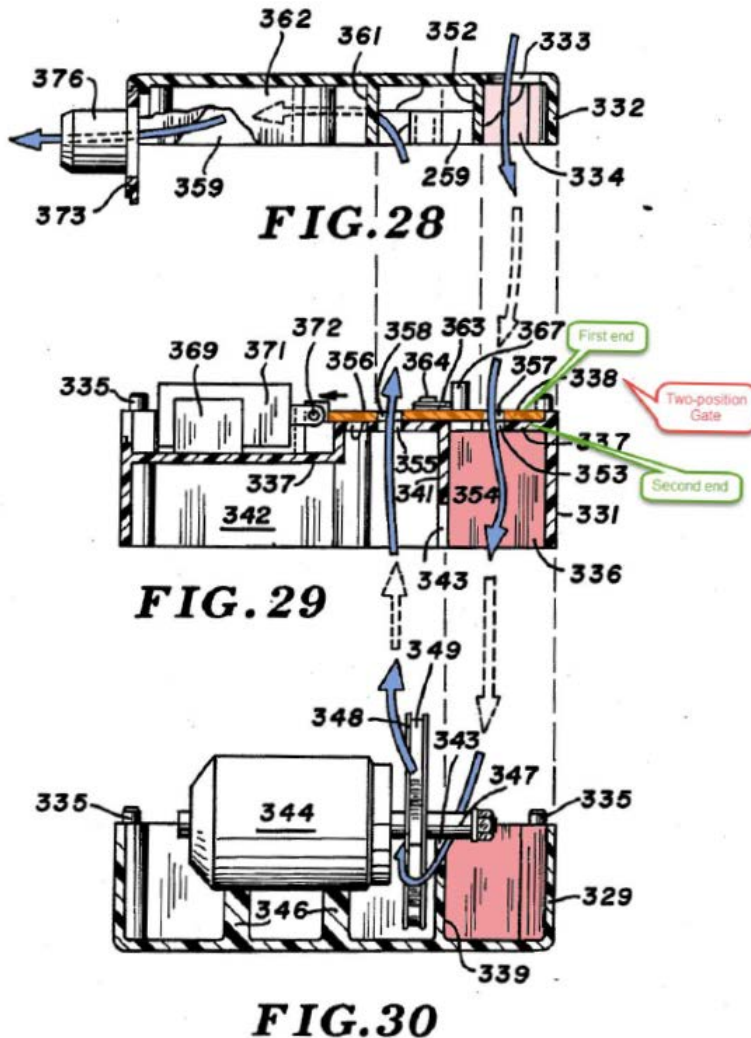
Petitioners state that Walker discloses the limitations in these claims. Pet. 60–65 (citing Ex. 1102 ¶¶ 236–247).

Petitioners provide the following annotated versions of Figures 28–30 of Walker, which add (1) blue overlay to show air flow, (2) red overlay to identify various chambers, (3) text boxes to identify a “First end” and “Second end” of gate 338, (4) a text box identifying gate 338 as a two-position gate, and (5) orange overlay for gate 338.

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Pet. 63. Figures 28–30 show sectional views at different locations within the air control apparatus. Ex. 1110, 4:35–40. Citing portions of the description of the inflating configuration in Walker, Petitioners explain how Walker discloses the airflow pathways recited in these claims. *See* Pet. 60–65 (citing Ex. 1110, 11:52–54, 12:27–33, 13:6–9, Figs. 20, 24; Ex. 1102 ¶¶ 236–247; Ex. 1166).

The record evidence, summarized above, supports Petitioners’ position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated

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by a preponderance of the evidence that Walker discloses the limitations in claims 8 and 9. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 8 and 9 would have been obvious based on Walker and Chaffee.

g. Dependent Claims 10 and 11

Claim 10 depends from claim 8, and recites “wherein the fan and motor assembly causes air to be conveyed from the second end of the air conduit to the first end of the air conduit when the air conduit is in the second position.” Ex. 1101, 8:66–9:2. Claim 11 depends from claim 10, and recites “wherein the fan and motor assembly causes air to be conveyed in sequence from the inflatable body, through the second end of the air conduit, to the first end of the air conduit, to ambient when the air conduit is in the second position.” *Id.* at 9:3–7.

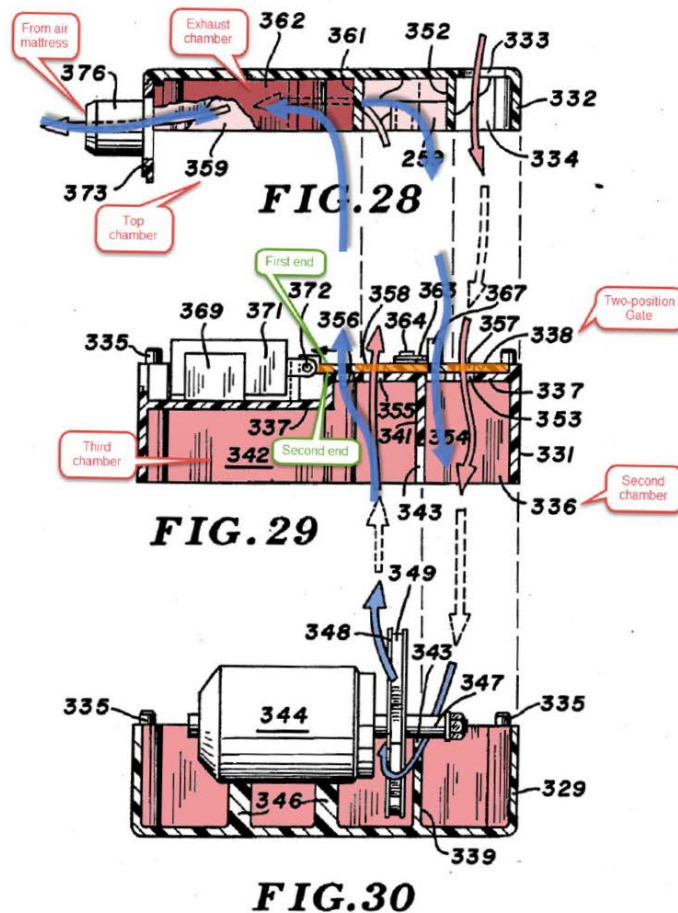
Petitioners state that Walker discloses the limitations in these claims. Pet. 65–68 (citing Ex. 1102 ¶¶ 248–257).

Petitioners provide the following annotated versions of Figures 28–30 of Walker, which add (1) blue overlay to show air flow, (2) red overlay and text boxes to identify various chambers, (3) text boxes to identify a “First end” and “Second end” of gate 338, (4) text boxes identifying gate 338 as a two-position gate and identifying air flow “From air mattress,” and (5) orange overlay for gate 338.

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Pet. 67. Figures 28–30 show sectional views at different locations within the air control apparatus. Ex. 1110, 4:35–40. Citing portions of the description of the deflating configuration in Walker, Petitioners explain how Walker discloses the airflow pathways recited in these claims. *See* Pet. 65–68 (citing Ex. 1110, 12:33–38, 13:9–12; Ex. 1102 ¶¶ 248–257; Ex. 1166).

The record evidence, summarized above, supports Petitioners’ position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Walker discloses the limitations in claims 10 and 11. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioners

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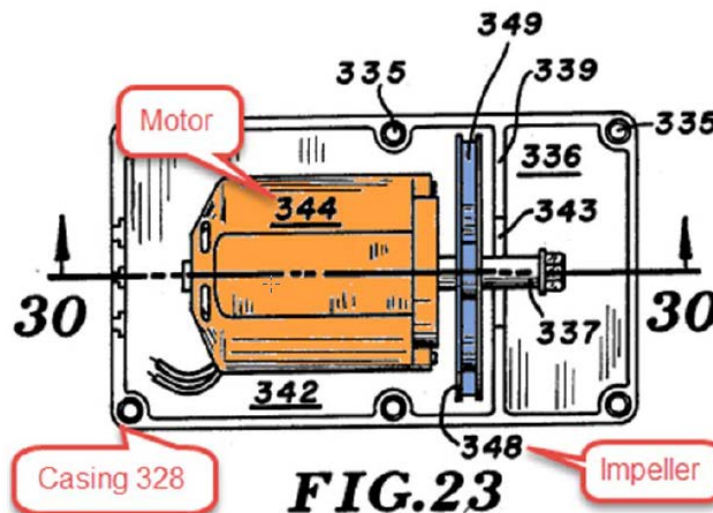
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have demonstrated by a preponderance of the evidence that claims 10 and 11 would have been obvious based on Walker and Chaffee.

h. Dependent Claim 12

Claim 12 depends from claim 1, and recites “wherein the fan and motor are received in the housing.” Ex. 1101, 9:8–9. According to Petitioners, Walker discloses this limitation. Pet. 68–69 (citing Ex. 1102 ¶ 258). Petitioners provide the following annotated versions of Figure 23 of Walker, which adds (1) blue overlay and text box to impeller 348, (2) an orange overlay and text box to motor 344, and (3) a text box identifying casing 328.



Pet. 69. Figure 23 shows a sectional view taken along line 23–23 in Figure 21. Ex. 1110, 4:25–26. Referring the annotated Figure 23 above, Petitioners state: “Walker taught that ‘electric motor 344 [orange] is located in chamber 342’ inside of casing 328, and that ‘impeller 348 [blue] is mounted on the drive shaft 3[3]7’ inside of casing 328.” Pet. 68–69 (quoting Ex. 1110, 12:5–11, with bracketed text added by Petitioners) (citing Ex. 1102 ¶ 258).

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The record evidence, summarized above, supports Petitioners' position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Walker discloses this limitation. Patent Owner does not present arguments addressing this claim. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claim 12 would have been obvious based on Walker and Chaffee.

i. Claims 16–19 and 21–23

For independent claim 16, Petitioners reference their positions with respect to claims 1, 7, 8, and 11. *See* Pet. 69 (citing Ex. 1102 ¶¶ 259–260). For claims 17–19 and 21–23, which depend from claim 16, Petitioners reference their positions with respect to claims 2–4, 6, 9, and 12, respectively. *See id.* at 70 (citing Ex. 1102 ¶¶ 261–272).

As to claims 16–18, 22, and 23, for the same reasons discussed above in the discussions of claims 1–3, 7–9, 11, and 12, we find that Walker as modified by Chaffee satisfies the limitations of claims 16–18, 22, and 23. Patent Owner does not present arguments addressing these claims aside from the arguments discussed above as to claim 1. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 16–18, 22, and 23 would have been obvious based on Walker and Chaffee.

As to claims 19 and 21, for the same reasons discussed above as to claims 4 and 6, we determine, based on the complete record, that Petitioners have not demonstrated by a preponderance of the evidence that claims 19 and 21 would have been obvious based on Walker and Chaffee.

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**D. ASSERTED OBVIOUSNESS OF CLAIMS 1–4, 6–12, 16–19, AND 21–23
BASED ON WALKER AND GOLDSMITH**

Petitioners assert that claims 1–4, 6–12, 16–19, and 21–23 of the ’394 patent are unpatentable under 35 U.S.C. § 103(a) based on Walker and Goldsmith. Pet. 22, 70–77; Pet. Reply 12–14. Patent Owner provides arguments specifically addressing this asserted ground. *See* PO Resp. 40–47; PO Surreply 15–17.

1. Goldsmith

In this ground, Petitioners rely on Goldsmith in addition to Walker (*see supra* § II.D.1). Goldsmith “relates to improvements in mattresses and has particular reference to the type known as ‘inner spring mattresses.’” Ex. 1107, 1:1–3. Goldsmith discloses providing an inner spring mattress with means “for blowing air of varying temperatures into the inner compartment of the mattress, and permitting such air to circulate through the said inner compartment, and to heat or cool the mattress to a temperature above or below the normal outside or surrounding temperature.” *Id.* at 1:4–12. Figure 1 of Goldsmith is reproduced below:

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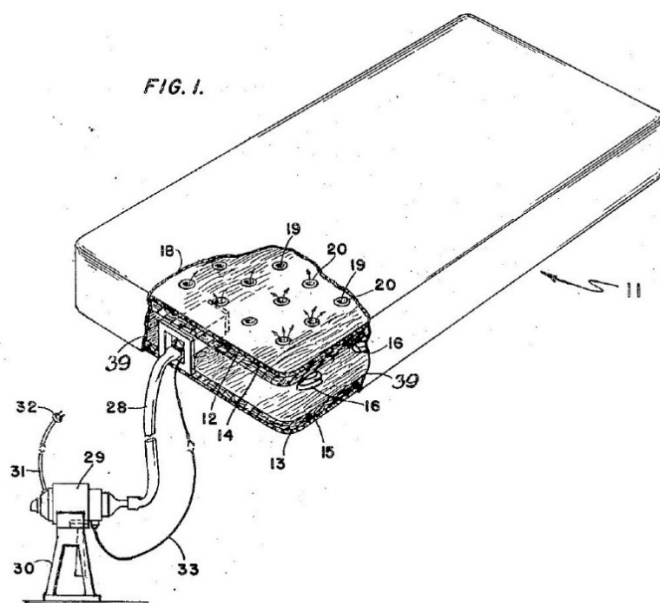
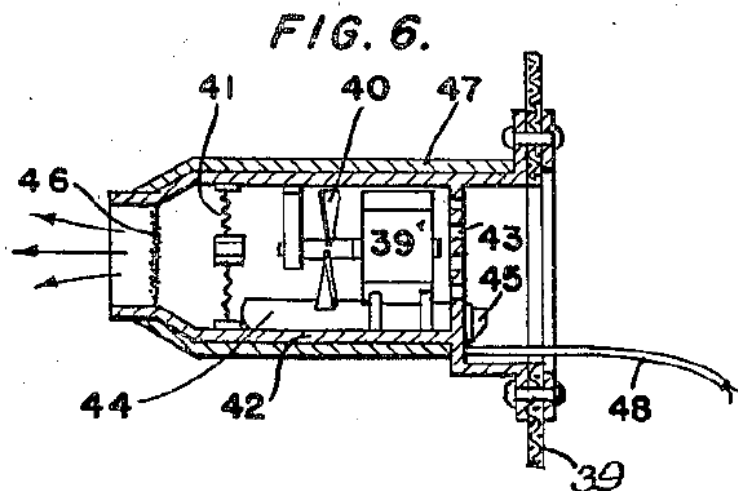


Figure 1 depicts “a perspective view, partly broken away, of a mattress and shows an air blowing mechanism attached thereto.” *Id.* at 2:19–21. As shown in Figure 1, Goldsmith discloses one embodiment in which blower unit 29 provides air to one end of inner spring mattress 11 via tube 28. *See id.* at 2:51–3:1. Goldsmith discloses that wall 39 “encircles the mattress and acts to prevent the air within the aforesaid air compartment 17 from escaping.” *Id.* at 3:25–28.

Figure 6 of Goldsmith is reproduced below:



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Figure 6 depicts a “sectional view showing a modified form of air distributing chamber which forms a part of th[e] invention.” *Id.* at 2:30–32. The alternative embodiment shown in Figure 6 includes, among other aspects, motor 39’ and fan 40 inside distribution casing 42, which is “mounted or attached to the mattress” previously described. *Id.* at 4:1–5. Goldsmith states: “With this form set [shown in Figure 6] within the mattress, no outside [blower] unit is necessary.” *Id.* at 4:11–12.

2. Analysis

a. Independent Claim 1

Petitioners contend that the proposed combination of Walker and Goldsmith satisfies each of the limitations of independent claim 1. Pet. 71–76. To support their arguments, Petitioners identify certain passages in the cited references and explain the significance of each passage with respect to the corresponding claim limitation. *Id.* Petitioners also identify reasons why one of ordinary skill in the art at the time of the invention would have been motivated to modify Walker based on Goldsmith. *Id.* at 74–76. We address in turn below, the subject matter of each limitation in claim 1, then Petitioners’ identified reasons to modify Walker based on Goldsmith, and then objective evidence of nonobviousness.

(1) The “Inflatable Body” Limitation and the “Fan and Motor” Limitation

To address the “inflatable body” and “fan and motor” limitations for this asserted ground, Petitioners again rely on Walker and refer to their analysis of these limitations in the prior ground. Pet. 71 (citing Pet. 32–34, 43–56; Ex. 1002 ¶¶ 279–280). For the same reasons as above (*see supra* § II.C.3.a.1–2), we find, based on the complete record, that Walker discloses

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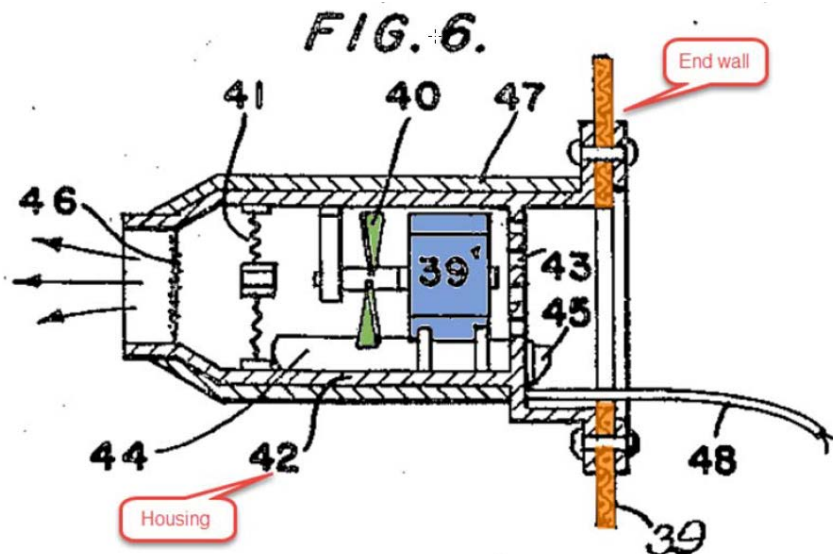
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these limitations. Patent Owner does not present arguments for these limitations.

(2) The “Built Into” Limitation

Petitioners assert that Walker as modified by Goldsmith satisfies the “built into” limitation. *See* Pet. 71–76. Petitioners state that “Goldsmith’s casing 42 (the housing) is ‘mounted or attached to the mattress’ air compartment walls 39 (orange in Fig. 6, below) by ‘rivets [] or by other suitable means’ and recessed therein via distribution casing 42.” *Id.* at 74–75 (quoting Ex. 1107, 2:54–55, 4:1–5). Petitioners provide the following annotated version of Figure 6 of Goldsmith, with (1) end wall 39 overlaid in orange and identified with a text box, (2) casing 42 identified with a text box as “Housing,” and (3) fan 40 overlaid in green and motor 39 overlaid in blue:



Pet. 75. Figure 6 of Goldsmith depicts a “sectional view showing a modified form of air distributing chamber which forms a part of th[e] invention.”

Ex. 1107, 2:30–32. Petitioners argue that one of ordinary skill in the art “would have understood Goldsmith’s casing 42 to be built in, as rivets are

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permanent connections and ‘other suitable means’ suggests similar permanent connections.” Pet. 75 (citing Ex. 1107, 2:54–55, 4:1–5; Ex. 1102 ¶¶ 283–286; Ex. 1167, 23–24). According to Petitioners, one of ordinary skill in the art at the time of the invention “would have had numerous reasons for building Walker’s casing 328 of air pump 323 into air mattress 319, like the built in design disclosed in Goldsmith.” *Id.* at 75–76 (citing Ex. 1102 ¶ 287; Pet. 36–43). We will discuss Petitioners’ reasoning below. *See infra* § II.D.2.a.4.

Patent Owner argues that even if combined, Walker and Goldsmith does not satisfy the “built into” limitation. PO Resp. 46–47. Specifically, Patent Owner argues that mattress 11 in Goldsmith “is not an inflatable body as it is not substantially airtight and beyond that is designed not to expand at all with air.” *Id.* at 46. According to Patent Owner, Goldsmith instead discloses “a traditional non-inflatable mattress that has holes in it so air can circulate through those hol[e]s for heating or cooling, with no air retained in the mattress.” *Id.* (citing Ex. 1107, 1:1–3, 1:13–19, 2:47–48). Patent Owner contends that because “Goldsmith does not disclose an ‘inflatable body[,]’ it also cannot disclose a housing that is ‘built into’ such a body.” *Id.*

As an initial matter, as discussed above, we do not construe “inflatable body” to include a “substantially airtight” requirement. *See supra* § II.B.1. Moreover, Patent Owner’s arguments are not convincing because they do not address specifically the modification proposed by Petitioners in this asserted ground. As discussed above, in this asserted ground, Petitioners rely on a *combination* of Walker and Goldsmith—rather than Goldsmith alone—to satisfy the “built into” limitation. *See, e.g.*, Pet. 74 (stating that one of ordinary skill in the art “would have been motivated

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by the built-in housing teachings of Goldsmith . . . to build Walker’s casing 328 (the housing) into air mattress 319 (the inflatable body)’’); *see also Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1050 (Fed. Cir. 2019) (“A finding of obviousness . . . cannot be overcome ‘by attacking references individually where the rejection is based upon the teachings of a combination of references.’” (quoting *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986))); Pet. Reply 13 (“The combination of Walker and Goldsmith discloses a ‘housing built into the inflatable body,’ as Walker discloses an inflatable body in air mattress 319, and Goldsmith teaches a pump housing built into a mattress.” (citing Ex. 1625 ¶¶ 68–71, 77, 78)). For the reasons above, we find, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that Walker as modified by Goldsmith discloses the subject matter of the “built into” limitation.³³

*(3) The “Interior Region,” “Air Conduit,” and
“Wherein” Limitations*

To address the “interior region,” “air conduit,” and “wherein” limitations for this asserted ground, Petitioners again rely on Walker and refer to their analysis of these limitations in the prior ground. Pet. 71 (citing Pet. 32–34, 43–56; Ex. 1002 ¶¶ 279–280). For the same reasons as above (*see supra* § II.C.3.a.4–6), we find, based on the complete record, that Walker discloses these limitations. Patent Owner does not present arguments for these limitations.

³³ We address below Patent Owner’s arguments that one of ordinary skill in the art would not have modified Walker based on Goldsmith as proposed. *See infra* § II.D.2.a.4.

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(4) The Asserted Reasons to Modify Walker with Goldsmith

Petitioners assert that one of ordinary skill in the art at the time of the invention “would have had numerous reasons for building Walker’s casing 328 of air pump 323 into air mattress 319, like the built in design disclosed in Goldsmith.” Pet. 75–76 (citing Ex. 1102 ¶ 287). Essentially, Petitioners rely on the same reasons discussed above in the context of the asserted ground based on Walker and Chaffee for building Walker’s casing 328 of air pump 323 into air mattress 319. *Id.* at 76; *see also id.* at 40–43 (providing reasoning for the “built into” limitation in the context of the asserted ground of Walker and Chaffee).

First, Patent Owner argues that Goldsmith is nonanalogous art and, thus, that one of ordinary skill in the art would not have modified Walker based on Goldsmith. PO Resp. 41–45. “Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004).

As to the “field of endeavor” test, Petitioners state that “Goldsmith is from the same field of endeavor of inflatable products and/or fluid control devices, as Goldsmith discloses an air pump for a mattress.” Pet. 73–74 (citing Ex. 1107, 1:6–8; Ex. 1102 ¶ 131). Patent Owner argues that mattress 11 in Goldsmith “does not expand” and that “Goldsmith is directed to a conventional inner spring non-inflatable air mattress with holes in it and a blower to circulate air through the holes for heating or cooling.” PO

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Resp. 41 (citing Ex. 1107, 1:13–19, 2:47–51; Ex. 2129 ¶ 109). Patent Owner highlights Petitioners’ reliance on paragraph 132 of the testimony of Dr. Beaman, which states that “Goldsmith’s mattress would necessarily and naturally expand, as the internal air pressure would build up around the ports 19 in the upper mattress layer.” Ex. 1102 ¶ 132, *quoted at* PO Resp. 42–43.³⁴ Patent Owner argues that “Dr. Beaman gives no supporting facts or data for his opinion that the mattress would expand, and as such his testimony should be given little or no weight.” PO Resp. 43 (citing 37 C.F.R. § 42.65(a)). In the Reply, Petitioners do not address the “field of endeavor” test. *See* Pet. Reply 13–14. We find, based on the complete record, that Petitioners have not adequately demonstrated that Goldsmith is in the same field of endeavor as the ’394 patent.

Our inquiry is not complete, as we also consider whether Goldsmith satisfies the “reasonably pertinent” test. Petitioners state that one of ordinary skill in the art “would have viewed Goldsmith as reasonably pertinent to the problem with which the ’394 Patent is involved—i.e., building a fluid control device into an inflatable body to overcome problems that arise when the pump/fluid control device is separate from the inflatable body.” Pet. 74 (citing Ex. 1101, 1:22–28; Ex. 1107, 4:11–12; Ex. 1102 ¶ 133). Patent Owner argues that Goldsmith is not “reasonably pertinent to the problem faced by the inventor of the ’394 Patent, which was to provide a modified air mattress having a built-in electric air pump.” PO Resp. 44–45 (citing Ex. 1101, 1:16–27). Patent Owner states: “Petitioners note that one

³⁴ Patent Owner cites Exhibit 1002 ¶ 134, but that exhibit is not in this proceeding. The same statement by Dr. Beaman can be found, however, at Exhibit 1102 ¶ 132.

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embodiment of Goldsmith includes a blower bolted into the side of the mattress and stating ‘no outside [blower] unit is necessary.’ Ex. 1107, 4:11–12. But the problems are not related.” PO Resp. 45. According to Patent Owner, “Goldsmith has a hard structure for a coil spring mattress to mount a blower for blowing hot and cold air and has no issue with retaining air in the bed,” whereas “[i]n contrast, the ’394 patent inventor had to come up with an approach for mounting its pump in a substantially airtight way that allows for inflation of its mattress.” *Id.* Patent Owner also argues that “Goldsmith’s bed uses traditional materials for its coil spring bed (for 1945)” and that, “[i]n contrast[,], an airbed has lighter, and less durable materials for creating the inflatable chamber of the airbed.” *Id.* (citing Ex. 2129 ¶ 115).

Based on a passage in the Description of the Related Art section of the ’394 patent (cited by both Petitioners and Patent Owner), we determine that one problem with which the inventor of the ’394 patent was involved was providing a built-in air pump to thereby eliminate the need for an external pump. *See* Ex. 1101, 1:20–27. We are persuaded by Petitioners’ contention that the relied-upon embodiment of Goldsmith (Figure 6) is reasonably pertinent to that same problem. Pet. Reply 14 (“Goldsmith is reasonably pertinent to an undisputed problem identified in the ’394 Patent: to provide a built-in air pump to thereby eliminate the need for an external pump.”). Indeed, the passage from Goldsmith cited by Petitioners highlights how, in the relied-upon embodiment, “no outside [blower] unit is necessary.” Ex. 1107, 4:11–12.

Patent Owner improperly limits the problem at issue to providing a built-in air pump to a “modified air mattress.” PO Resp. 45; *see also id.*

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(arguing that “an *airbed* has lighter, and less durable materials” than Goldsmith (emphasis added)). With this argument, however, Patent Owner restricts the problem at issue to *only one* of the several embodiments or applications disclosed in the ’394 patent. *See, e.g.*, Ex. 1101, 4:13–16 (discussing “an inflatable product of a third embodiment of the present invention” shown in Figures 3A and 3B), 4:39–43 (discussing “an inflatable product of a fourth embodiment of the present invention [that] is an air mattress,” as shown in Figure 4A), 7:20–21 (discussing “an inflatable product of a ninth embodiment of the present invention [that] is an umbrella”). In light of the record here, we agree with Petitioners that the scope of analogous art is not so limited. *See* Pet. Reply 17 (stating that Patent Owner “argues that Goldsmith is not reasonably pertinent because it is not an airbed.” (citing PO Resp. 44–45; Ex. 1625 ¶¶ 72–74)); *see also Graham*, 383 U.S. at 35 (rejecting the argument that the cited references were not “pertinent prior art” and stating that “[t]he problems confronting [the patentee] and the insecticide industry were not insecticide problems; they were mechanical closure problems”).

In the Surreply, Patent Owner highlights the Federal Circuit’s decision in *In re Klein*, 647 F.3d 1343 (Fed. Cir. 2011). PO Surreply 10–12. Patent Owner argues that, in *Klein*, “the Federal Circuit held that references with different purposes were not reasonably pertinent despite involving similar technologies.” *Id.* at 11 (citing *Klein*, 647 F.3d at 1348, 1350–52).

According to Patent Owner, “[t]he ’394 patent is directed to “an inflatable product such as a mattress provided with an electric pump,” with “a primary objective” of providing “a modified air mattress having a built-in electric air

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pump, thereby eliminating the need for an external pump.” *Id.* (quoting PO Resp. 2–3).

We agree with Patent Owner as to the relevant holding of *Klein*. *See also In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992) (“If a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem, and that fact supports use of that reference in an obviousness rejection” whereas “[i]f [the reference] is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it.”). We are not persuaded by the application of *Klein*, however, because Patent Owner has not shown that the ’394 patent and Goldsmith are directed to different purposes.

Patent Owner improperly limits the “purpose” at issue to *only one* of the several embodiments or applications disclosed in the ’394 patent: “providing ‘*a modified air mattress* having a built-in electric air pump, thereby eliminating the need for an external pump.’” PO Surreply 11 (quoting, with emphasis added, PO Resp. 2–3)). Patent Owner does not identify the purpose of Goldsmith; instead, Patent Owner merely contends that “Goldsmith is not directed to ‘an inflatable product’ or ‘a modified air mattress’ at all” and thus, “Goldsmith is not reasonably pertinent.” PO Surreply 11. For the same reasons discussed above as to why the ’394 patent and Goldsmith are reasonably pertinent to the same problem, we determine that the ’394 patent and Goldsmith are directed to the same purpose: providing a built-in air pump to thereby eliminate the need for an external pump. Ex. 1101, 1:20–27; Ex. 1107, 4:11–12; *see Clay*, 966 F.2d at 659; *see also In re Paulsen*, 30 F.3d 1475, 1481–82 (Fed. Cir. 1994) (affirming rejection of a laptop computer hinge as obvious over hinged

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cabinets, piano lids, etc., because the “problem is not unique to portable computers”). For these reasons, we find, on the complete record, that Goldsmith is analogous art.

Second, Patent Owner contends that “[t]here is [n]o [m]otivation to [c]ombine Walker and Goldsmith.” PO Resp. 45–46. Specifically, Patent Owner argues that, for this ground, “Petitioners assert, without elaboration, that the same motivations for comb[in]ing W[alker] and Chaffee apply to combining Walker and Goldsmith.” *Id.* at 45–46 (citing Pet. 75). According to Patent Owner, “[i]t is improper to, without analysis and in a completely conclusory matter, simply cross apply Walker to Goldsmith, and the Board should not allow it.” *Id.* at 46. Patent Owner states, “[w]ere one to follow that ill-advised path, the above discussion of why one would not combine Walker with Chaffee would then apply here as well.” *Id.* (citing Ex. 2129 ¶ 117).

We do not agree with Patent Owner as to the alleged per se impropriety of Petitioners’ reliance, in the context of this asserted ground, on the same reasoning statements provided in the context of the ground of Walker and Chaffee. In both this asserted ground and the ground based on Walker and Chaffee, Petitioners contend that one of ordinary skill in the art would have modified Walker in a *similar way* based on *similar teachings* in both Chaffee and Goldsmith. *Compare, e.g.,* Pet. 36 (discussing how one of ordinary skill in the art “would have been motivated by the teachings of Chaffee and well-known design factors to build Walker’s air control apparatus 323 having casing 328 into air mattress 319” (citing Ex. 1102, ¶ 193)), *with id.* at 74 (stating that one of ordinary skill in the art “would have been motivated by the built-in housing teachings of Goldsmith . . . to

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build Walker’s casing 328 (the housing) into air mattress 319 (the inflatable body)” (citing Ex. 1102 ¶¶ 287–288)).

Moreover, given the similarities in the proposed modifications of Walker in each of the two grounds here, for the reasons discussed above (*see supra* § II.C.3.a.7), we determine, in light of the complete record, that Petitioners have shown that one of ordinary skill in the art at the time of the invention would have been motivated to modify Walker based on Goldsmith, as proposed, for at least the purposes of improved spatial efficiency and improved durability.

(5) Objective Evidence of Nonobviousness

The analysis of Patent Owner’s objective evidence of nonobviousness is the same for this asserted ground as for the prior asserted ground. Thus, for the same reasons discussed above (§ II.C.3.a.8), we determine, on the complete record, that Patent Owner is entitled to some, but not considerable, weight in favor of nonobviousness.

(6) Conclusion

For the reasons discussed above (§§ II.D.2.a.1–4), the evidence presented by Petitioners strongly indicates that claim 1 would have been obvious over Walker and Goldsmith. For the reasons also discussed above (§ II.D.2.a.5), Patent Owner’s objective evidence weighs only slightly in favor of nonobviousness. When considering all of the evidence of obviousness and nonobviousness together (*see Cyclobenzaprine*, 676 F.3d at 1079), we find Petitioners’ strong evidence of obviousness outweighs Patent Owner’s objective evidence of nonobviousness. Thus, we conclude Petitioners have demonstrated by a preponderance of the evidence that claim 1 would have been obvious over Walker and Goldsmith.

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b. Dependent Claims 2–4 and 6–12

For dependent claims 2–4 and 6–12, which depend from claim 1, Petitioners reference their positions with respect to the same claims in the context of the asserted ground of Walker in view of Chaffee as to why “Walker alone satisfie[s] these [additional] claim limitations.” *See* Pet. 76 (citing Pet. 57–69; Ex. 1102 ¶ 289).

As to claims 2, 3, and 7–12, for the same reasons discussed above in the discussions of those claims in the context of the prior ground, we find that Walker discloses the limitations in those claims. Patent Owner does not present arguments addressing those claims. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 2, 3, and 7–12 would have been obvious based on Walker and Goldsmith.

As to claims 4 and 6, Petitioners rely only on Walker to satisfy the recited limitations. *See* Pet. 76 (citing Pet. 57–69; Ex. 1102 ¶ 289). For the same reasons discussed above in the discussions of those claims in the context of the prior ground, we determine, based on the complete record, that Petitioners have not demonstrated by a preponderance of the evidence that claims 4 and 6 would have been obvious based on Walker and Goldsmith.

c. Claims 16–19 and 21–23

For independent claim 16, Petitioners again reference their positions with respect to claims 1, 7, 8, and 11, and, for claims 17–19 and 21–23, which depend from claim 16, Petitioners again reference their positions with respect to claims 2–4, 6, 9, and 12, respectively. *See* Pet. 77 (citing Pet. 69–70; Ex. 1102 ¶¶ 290–291).

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As to claims 16–18, 22, and 23, for the same reasons discussed above in the discussions of claims 1–3, 7–9, 11, and 12, we find that Walker as modified by Goldsmith satisfies the limitations of claims 16–18, 22, and 23. Patent Owner does not present arguments addressing these claims aside from the arguments discussed above as to claim 1. We determine, based on the complete record, that Petitioners have demonstrated by a preponderance of the evidence that claims 16–18, 22, and 23 would have been obvious based on Walker and Goldsmith.

As to claims 19 and 21, for the same reasons discussed above as to claims 4 and 6, we determine, based on the complete record, that Petitioners have not demonstrated by a preponderance of the evidence that claims 19 and 21 would have been obvious based on Walker and Goldsmith.

**E. ASSERTED OBVIOUSNESS OF CLAIMS 1–4, 6–12, 16–19, AND 21–23
BASED ON WALKER AND PARIENTI**

Petitioners assert that claims 1–4, 6–12, 16–19, and 21–23 of the ’394 patent are unpatentable under 35 U.S.C. § 103(a) based on Walker and Parienti. Pet. 22, 77–81; Pet. Reply 15–18. Patent Owner provides arguments specifically addressing this asserted ground. *See* PO Resp. 47–55; PO Surreply 12–15.

In the context of this ground, Petitioners again rely on Walker’s gate 338 as to the added limitations in claims 4, 6, 19, and 21. Pet. 81. For the reasons discussed above, Petitioners have not shown sufficiently that Walker’s gate 338 (as relied upon) is a “pipe” (claims 4 and 19) or a “switching pipe” (claims 6 and 21). *See supra* §§ II.C.3.c; II.C.3.d; II.C.3.i. Thus, Petitioners have not shown by a preponderance of the evidence that claims 4, 6, 9, or 21 are unpatentable over Walker and Parienti.

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Further, because the grounds based on Walker and Chaffee, and Walker and Goldsmith, are dispositive as to all of claims 1–3, 7–12, 16–18, 22, and 23, we need not reach the ground based on Walker and Parienti as to those claims. *See SAS Inst. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding that a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *see also, e.g., SK Hynix Inc. v. Netlist, Inc.*, IPR2017-00692, Paper 25 at 40 (PTAB July 5, 2018) (determining all challenged claims to be unpatentable and not addressing additional grounds).

F. ASSERTED OBVIOUSNESS OF CLAIMS 4–6 AND 19–21 BASED ON WALKER, ONE OF CHAFFEE, GOLDSMITH, OR PARIENTI, AND BASIC PNEUMATICS

Petitioners assert that claims 4–6 and 19–21 of the ’394 patent are unpatentable under 35 U.S.C. § 103(a) based on Walker; one of Chaffee, Goldsmith, or Parienti; and Basic Pneumatics.³⁵ Pet. 22, 81–97; Pet. Reply 18–22. Patent Owner provides arguments addressing this asserted ground of unpatentability. *See* PO Resp. 55–62; PO Surreply 15–17.

1. Basic Pneumatics

In this ground, Petitioners rely on Basic Pneumatics, in addition to Walker (*see supra* § II.C.1), and one of Chaffee (*see supra* § II.C.2), Goldsmith (*see supra* § II.D.1), or Parienti (*see supra* § II.F.2). Basic Pneumatics discloses types of directional control valves, including at least one embodiment of a rotary valve. Ex. 1111, 78 (rotary valves), 74

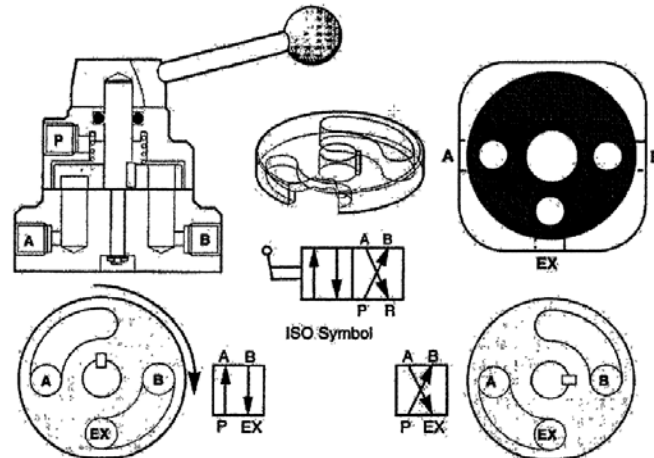
³⁵ As noted above (*see supra* n.10), we interpret this as three alternative grounds: (1) Walker, Chaffee, and Basic Pneumatics; (2) Walker, Goldsmith, and Basic Pneumatics; and (3) Walker, Parienti, and Basic Pneumatics.

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(identifying, in Figure 7.3, valve types). A portion of Figure 7.12 of Basic Pneumatics is reproduced below:



Ex. 1111, 78 (portion). The depicted portion of Figure 7.12 shows a section through a rotary disc valve. *Id.* Regarding the depicted rotary valve, Basic Pneumatics discloses that “[a] metal ported disc is manually rotated to interconnect the ports in the valve body” and that “[t]he pressure supply is above the disc.” *Id.* The bottom part of the portion of Figure 7.12 above shows two positions for the rotary valve: one position with port A connected to port P and port B connected to port EX and another position with port A connected to port EX and port B connected to port P. *Id.*

2. *Parienti*

In this ground, Petitioners rely on Parienti in addition to Walker (*see supra* § II.C.1). Parienti discloses that the “invention is made up of an inflatable mattress and an associated device for automatic inflating and deflating of the mattress” and that “[t]h[e associated] device is made interdependent with the mattress by means of gluing or any other means.”

Ex. 1108, 1:22–25. Figure 1 of Parienti is reproduced below:

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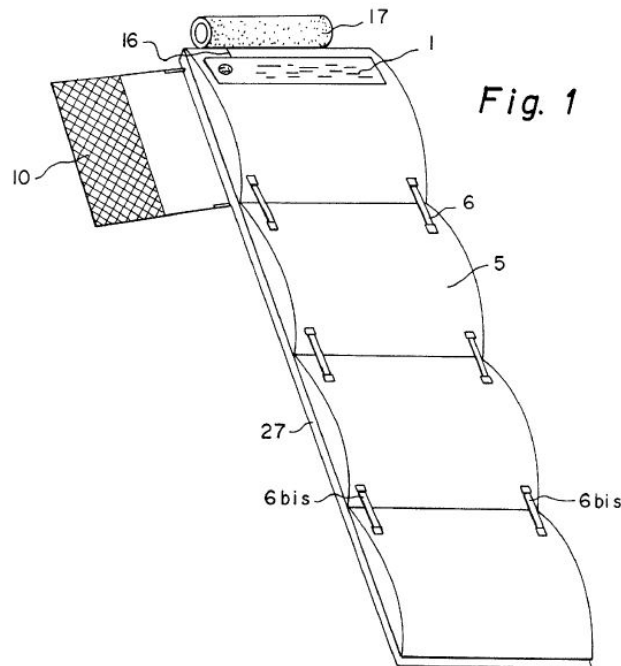


Figure 1 depicts “a plan view of the solar powered mattress of the . . . invention.” *Id.* at 1:36–37. The embodiment in Figure 1 shows, among other aspects, mattress 5, photovoltaic cells 1, and pipe 16 that may direct airflow to porous cylinder 17 for cooling a user. *See, e.g., id.* at 3:20–29.

Figures 4 and 5 are reproduced below:

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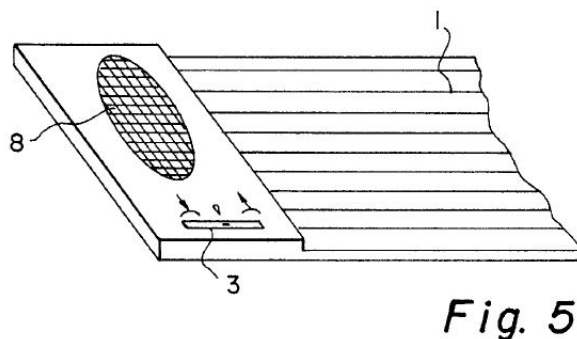
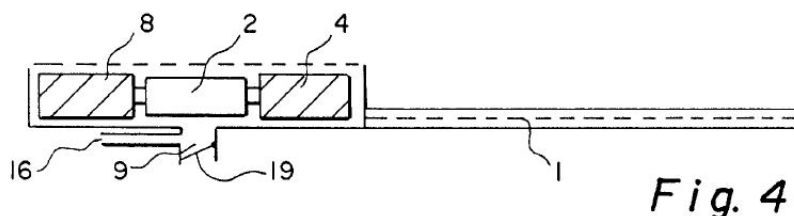


Figure 5 depicts “a plan view of a device for inflation/deflation of the solar powered mattress” and Figure 4 depicts a cross-sectional view of the device of Figure 5. *Id.* at 1:44–46. Parienti discloses:

Switching from inflating to deflating function is performed by reversing the polarity of the motor (2) that drives the turbine (4). Inflating is performed through the rotation of the turbine in one direction, what causes the suction of ambient air through the protective grid (8) and the introduction of the air into the mattress through the pipe (9). Likewise, deflating is performed through the rotation of the turbine in the reverse direction, what causes the suction of the air from the mattress and its exhausting to the exterior (FIG. 4).

Id. at 2:64–3:6.³⁶

³⁶ The lead line for protective grid 8 in Parienti’s Figure 4 mistakenly extends to a portion of turbine 4 rather than to protective grid 8, which is represented as the horizontal dashed line *above* turbine 4 and motor 2. *Compare* Ex. 1108, Fig. 4, *with id.* at Fig. 5.

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3. Analysis

Petitioners state that this asserted ground “is only necessary with respect to claims 4–6 and 19–21 to the extent that the Board construes ‘pipe’ to be limited to tubular or cylindrical objects, parts, or passages and finds that Walker’s rectangular gate 338 is not a pipe under this construction.”

Pet. 82. Because these conditions are met, we address this asserted ground.

As an initial matter, we note Patent Owner’s argument that Petitioners have not shown that Basic Pneumatics is a printed publication. *See* PO Resp. 56–58; PO Surreply 15; *see also* Pet. Reply 18–20 (responding to Patent Owner’s argument). Although we address the merits of Petitioners’ positions in the context of this asserted ground, we do not find it necessary to assess Patent Owner’s printed publication argument. Instead, we assume, for purposes of this Decision, that Basic Pneumatics is a printed publication. We turn now to a background of Petitioners’ reliance on Basic Pneumatics and then to the analysis of this asserted ground.

In the context of this ground, Petitioners contend that gate 338 in Walker “is a type of directional control valve well-known to POSAs as of the Priority date” and that gate 338 “and its surrounding assembly is a variation of a 4/2 directional control valve because it has four basic ports and two positions.” Pet. 82 (citing Ex. 1102 ¶¶ 113, 313–314). Petitioners state that “[a]lthough gate 338 in Walker is a standard directional control valve . . . , gate 338 has a rectangular shape and linearly slides, rather than rotates.” *Id.* at 90 (citing Ex. 1110, 12:25–27, Fig. 25; Ex. 1102 ¶ 320). Petitioners contend that “Basic Pneumatics taught a variation of a 4/2 directional control valve, like Walker’s gate 338, that was *cylindrical* and

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rotatable.” *Id.* at 91; *see also id.* at 92–93 (discussing alleged teachings of Basic Pneumatics).

According to Petitioners, one of ordinary skill in the art at the time of the invention “would have found it obvious to modify Walker’s gate 338 (a linearly sliding 4/2 directional control valve) to make it cylindrical and rotational based on the teachings of Basic Pneumatics” and “would have been motivated to modify Walker in this manner” for certain reasons. Pet. 93; *see also id.* at 93–94 (citing Ex. 1102 ¶ 325), 95 (citing Ex. 1102 ¶ 329). Petitioners take the position that “[a]s a result of such a modification, Walker’s modified, cylindrical gate 338 would have” satisfied claims 4–6 and 19–21. *Id.* at 96. Specifically, Petitioners state that

As a result of [the proposed] modification, Walker’s modified, cylindrical gate 338 would have: (1) constituted a pipe (as required by Claims 4–6) because gate 338 would be cylindrical, like the rotating cylinder disclosed in Figure 7.12 of Basic Pneumatics; (2) constituted a pipe that is rotatable (as required by claim 5) because gate 338 would rotate between its first (inflate) and second (deflate) positions, rather than translate; and (3) constituted a switching pipe (as required by claim 6), as gate 338 would switch between inflate and deflate modes of operation of air control apparatus 323.

Pet. 96 (citing Ex. 1102 ¶ 332).

As discussed above, for claims 4–6 and 19–21, Petitioners rely on a “modified, cylindrical” version of gate 338 in Walker as the recited “pipe.” *See, e.g.,* Pet. 96–97. Here (similar to the prior asserted ground), Petitioners identify the entirety of modified, cylindrical gate 338—including *both* openings 357 and 358—as the “pipe.” As evidence of this, in response to Patent Owner’s argument that “the control valve [in Basic Pneumatics] is a planar disc with two apertures” and “[t]he apertures are not tubular or

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cylindrical, and thus neither aperture is a pipe” (PO Resp. 59), Petitioners clarify: “It is not, as [Patent Owner] contends, the ‘kidney-shaped apertures’ ([*id.*]) but, rather, the disc structure in which those apertures are formed.” Pet. Reply 20 (citing Ex. 1625 ¶¶ 96–97; Ex. 1111, 78 (Fig. 7.12)).

With the proposed modification, the overall shape of gate 338 would become cylindrical—like the rotary valve in Basic Pneumatics (*see* Pet. 92)—but, as stated by Petitioners, the air flow through openings 357 and 358 in this modified device would be the same as discussed above (*see supra* II.C.3.c). *See* Pet. Reply 21 (stating that “the openings in the rotating cylindrical disc would simply align with Walker’s casing openings 353 and 355 in a first position and openings 354 and 356 in a second position, *in a similar manner as linear gate 338*” (emphasis added) (citing Ex. 1625 ¶¶ 101–104)). Thus, for the same reasons discussed above (*see supra* § II.C.3.c), Petitioners have not shown that the modified, cylindrical version of gate 338 (as relied upon) is a “pipe.” *See* PO Surreply 16 (“A mostly-solid disc with two apertures cut into it is neither a hollow cylinder nor a tubular object.” (discussing Inst. Dec. 26)); *see also* PO Resp. 55 (arguing that “the rotating ‘ported disk’ of Basic Pneumatics (Ex. 1111, FIG. 7.12) is also not a ‘pipe’ for reasons similar to those discussed for Walker”). Nor do Petitioners rely on Chaffee, Goldsmith, Parienti, or Basic Pneumatics alone to satisfy this claim element. Accordingly, we determine, based on the complete record, that Petitioners have not demonstrated by a preponderance of the evidence that claim 4 would have been obvious based on (1) Walker, Chaffee, and Basic Pneumatics; (2) Walker, Goldsmith, and Basic Pneumatics; or (3) Walker, Parienti, and Basic Pneumatics.

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Claims 5 and 6 depend from claim 4. *See* Ex. 1101, 8:49–52. For the reasons discussed above as to claim 4 in the context of this asserted ground, we determine, based on the complete record, that Petitioners have not demonstrated by a preponderance of the evidence that claims 5 and 6 would have been obvious based on (1) Walker, Chaffee, and Basic Pneumatics; (2) Walker, Goldsmith, and Basic Pneumatics; or (3) Walker, Parienti, and Basic Pneumatics.

For claims 19–21, Petitioners reference their positions with respect to claims 4–6, respectively. *See* Pet. 96 (citing Ex. 1102 ¶¶ 334–336). For the reasons discussed above as to claim 4 in the context of this asserted ground, we determine, based on the complete record, that Petitioners have not demonstrated by a preponderance of the evidence that claims 19–21 would have been obvious based on (1) Walker, Chaffee, and Basic Pneumatics; (2) Walker, Goldsmith, and Basic Pneumatics; or (3) Walker, Parienti, and Basic Pneumatics.

G. MOTIONS TO EXCLUDE EVIDENCE

1. Petitioners’ motion to exclude evidence

Petitioners filed a motion to exclude certain exhibits that Petitioners contend are not cited in the Patent Owner Response, Surreply, or any expert declaration. Paper 93, 1. Petitioners seek to exclude this evidence as irrelevant under Federal Rules of Evidence Rules 401 and 402. *Id.* (the “Uncited Exhibits”). Petitioners also argue that certain paragraphs in

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Ex. 2029 (Dr. Stevick's Declaration) and Ex. 2638 (Dr. Becker's Declaration) should be excluded. *Id.* at 2–6 (the "Declaration Portions").

a. Uncited Exhibits

With respect to the Uncited Exhibits, Petitioners argue that prior Board decisions provide that exhibits not cited in a patent owner's papers should be excluded. Paper 93, 1–2.

In opposition, Patent Owner argues, with respect to certain of the Uncited Exhibits, that these exhibits are exhibits to depositions. Paper 98, 1. Specifically, Patent Owner argues that Exhibits 2030, 2031, 2032, 2033, 2751, and 2752 are exhibits to Dr. Beaman's deposition testimony (Exhibits 2040 and 2753). *Id.* Patent Owner adds that Petitioners did not properly object to the evidence, as they did not object to the evidence during the depositions. *Id.* at 2.³⁷

Petitioners reply that, as to the Uncited Exhibits, Patent Owner addresses only a subset of the exhibits covered in Petitioners' motion. Paper 101, 1 (identifying Exs. 2134, 2143, and 2144 as uncontested by Patent Owner). As to the contested exhibits, Petitioners argue that Patent Owner does not identify where in its papers it relies on Dr. Beaman's testimony directed to any of the exhibits challenged by the motion. *Id.* at 2. Petitioners argue that, without reliance on these sections, the exhibits should be excluded. *Id.* at 2–3.

Petitioners maintain that Patent Owner's argument that Petitioners failed to object at the deposition is nonsensical. Paper 101, 3. Petitioners

³⁷ Patent Owner does indicate that Exhibit 2030 was objected to at the deposition, but on the basis that it was derived from a different proceeding. Paper 98, 2.

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argue that they could not have known at the time of the deposition that Patent Owner would not rely on those exhibits in its later-filed papers. *Id.* at 3–4.

As to Exhibits 2134, 2143, and 2144, which are not contested by Patent Owner, we deny Petitioners’ motion as moot, as we do not rely on them in this Decision. *See* Trial Practice Guide Update, 17 (August 2018), available at <https://go.usa.gov/xU7GP> (“In the Board’s experience, consideration of the objected-to evidence is often unnecessary to resolve the patentability of the challenged claims, and the motion to exclude is moot.”); *see also* Office Patent Trial Practice Guide, August 2018 Update, 83 Fed. Reg. 39,989 (Aug. 13, 2018) (notice).

We also deny Petitioners’ motion as to the other Uncited Exhibits (Exhibits 2030, 2031, 2032, 2033, 2751, and 2752). As Patent Owner explains, these exhibits were used in conducting Dr. Beaman’s depositions (Ex. 2040 and Ex. 2753) and the complete deposition transcripts are in the record. Although we do not rely on these exhibits in our Decision, we do rely on Dr. Beaman’s depositions. We determine that it is proper to maintain Exhibits 2030, 2031, 2032, 2033, 2751, and 2752 in the record, as they are relevant to testimony in the depositions, even if that testimony is not ultimately relied upon by Patent Owner or Petitioners in this proceeding. If we followed Petitioners’ reasoning, in cases where a deposition or declaration covers multiple, related proceedings, portions of those exhibits would need to be removed to the extent they do not apply to any one proceeding. Similarly, to the extent that a line of questioning in a deposition or testimony in a declaration eventually is not used to support a party’s position, that evidence would need to be excluded from the record. Such an

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approach would make dealing with evidence, particularly evidence entered in multiple proceedings as we have here, cumbersome for the parties to manage. Accordingly, we determine that we will maintain in the record of this proceeding the complete record of Dr. Beaman's depositions, including the associated exhibits.

b. Declaration Portions

With respect to the Declaration Portions, Petitioners argue that this evidence represents arguments that are improperly incorporated by reference by Patent Owner. Paper 93, 2–6.

Patent Owner argues that a motion to exclude evidence is not the proper vehicle to address incorporation by reference. Paper 98, 3. Patent Owner explains that we ruled on a motion to strike directed to the Declaration Portions. *Id.*; *see* Paper 75 (providing an Order denying Petitioners' motion to strike). Patent Owner also argues that Petitioners' motion improperly incorporates arguments from its motion to strike. Paper 98, 4–5. Finally, Patent Owner argues that it did not improperly incorporate arguments from its experts' declarations. *Id.* at 5–9. Petitioners' Reply reiterates that the Declaration Portions were improperly incorporated by reference into the Patent Owner Response. Paper 101, 4–5.

We deny Petitioners' motion to exclude the Declaration Portions. Motions to exclude evidence are used to exclude evidence that is not admissible. *See* Trial Practice Guide Update, 16–17. Petitioners do not argue that the Declaration Portions represent *inadmissible* evidence. Paper 93, 2–6. Instead, Petitioners argue that the Declaration Portions represent improper *argument*, rather than evidence. *See* Paper 93, 2–6. Petitioners fail to provide any basis under the Federal Rules of Evidence as to why the

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Declaration Portions are inadmissible. *See id.*; Trial Practice Guide Update, 16 (“A motion to exclude must explain why the evidence is not admissible (e.g., relevance or hearsay).”). Although Petitioners did object to Exhibits 2129 and 2638, these objections were directed to bases under the Federal Rules of Evidence not argued in their motion. *See* Paper 54, 2, 19. As such, we are unclear as to why Petitioners contend that the Declaration Portions are inadmissible.

Petitioners appear to use the motion to exclude to reargue their motion to strike, this time trying to exclude the underlying declaration paragraphs, rather than the sections of the Patent Owner Response that allegedly incorporate by reference these paragraphs. *See id.*; *see also* Paper 75 (providing our decision on Petitioners’ motion to strike portions of the Patent Owner Response). We already addressed their motion to strike and how we would address any arguments improperly incorporated by reference. Paper 75.

2. Patent Owner’s motion to exclude evidence

We now turn to Patent Owner’s motion to exclude evidence. In this motion, Patent Owner first “objects to Exhibits 1665–1669 on the ground that they contain improper attorney argument in violation of the page/word count limits for replies.” Paper 95, 1. Second, Patent Owner contends that Exhibit 1625, Dr. Beaman’s declaration supporting the Reply, mischaracterizes certain earlier testimony of Patent Owner’s expert and exceeds the proper scope of a reply. *Id.* at 3. Third, Patent Owner objects, provisionally, to Exhibit 1650, a declaration by Ryan Slate, because Patent

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Owner was not afforded an opportunity to depose the declarant. *Id.* at 4–5.³⁸

Fourth, Patent Owner contends that Exhibits 1651–1654 and 1679 include hearsay, are irrelevant, are unfairly prejudicial, and lack foundation. *Id.* at 5. Fifth, Patent Owner contends that Exhibits 1268, 1269, and 1270, and references to these exhibits in Ex. 1202, should be excluded under Federal Rules of Evidence 402, 403, and 1002. *Id.* at 10. Sixth, and finally, Patent Owner argues that Exhibit 1111 should be excluded under Federal Rules of Evidence 1002 and 1003. *Id.* at 11. We address each of these categories in turn, below.

In opposition to this motion, Petitioners argue that Patent Owner’s motion to exclude fails to follow our rules and procedures for a motion to exclude and that we should deny the motion, in its entirety, on that basis. Paper 99, 1–2 (quoting Office Patent Trial Practice Guide, 77 Fed. Reg. at 48,767). We decline to deny Patent Owner’s motion on this basis. We note that Petitioners’ motion, which we addressed above, also fails to follow the procedure outlined in the Office Patent Trial Practice Guide. *See* Paper 93.

a. Exhibits 1665–1669

Patent Owner argues that Exhibits 1665 through 1669 improperly incorporate attorney argument into Petitioners’ Reply. Paper 95, 1–3. These exhibits are directed to Petitioners’ allegations that Patent Owner improperly

³⁸ Patent Owner does not address this evidence in reply to Petitioners’ contention that this objection should be withdrawn. *See* Paper 99, 6; Paper 102. We do not address this exhibit further.

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incorporates arguments from declarations into its Patent Owner Response.

See id.

In opposition, Petitioners argue that Patent Owner does not cite any evidentiary basis for excluding these exhibits and that a motion to exclude is not the proper procedure to challenge these exhibits. Paper 99, 12 (referencing Trial Practice Guide Update, August 2018). Patent Owner replies that, by filing Exhibits 1665–1669, Petitioners exceeded the word count for a Reply. Paper 102, 2.

We do not exclude Exhibits 1665–1669. Patent Owner provides no evidentiary basis why these exhibits constitute inadmissible evidence. To the extent that these exhibits do contain attorney argument, the proper remedy in such a situation is for us, when considering Petitioners’ Reply arguments and evidence as a whole, to not consider any “arguments” found only in these exhibits and not adequately explained in the Reply. *See* Trial Practice Guide Update, 17–18; *cf.* Paper 75, 5 (addressing Petitioners’ motion to strike).

b. Exhibit 1625

Patent Owner argues that Dr. Beaman’s reply declaration mischaracterizes testimony from Patent Owner’s declarant in support of its preliminary response (Dr. Durfee), based on characterizations of the testimony from Petitioners’ counsel. Paper 95, 3–4. Patent Owner also argues that addressing Dr. Durfee’s testimony, which was not relied on in the Patent Owner Response, is outside the scope of a proper reply. *Id.* at 3.

Petitioners argue that Patent Owner does not provide a basis under the rules of evidence to exclude Dr. Beaman’s testimony. Paper 99, 5.

Petitioners add that a motion to exclude should not be directed to arguments

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or evidence that a party believes exceeds the proper scope of a reply. *Id.* Finally, Petitioners argue that the testimony sought to be excluded identifies inconsistencies between Patent Owner’s declarants’ testimony. *Id.* at 6.

In reply, Patent Owner argues that Dr. Beaman’s testimony lacks foundation. Paper 102, 3.

We do not exclude this evidence. Patent Owner did not rely on a lack of foundation in its objection to Dr. Beaman’s testimony or in the original motion to exclude. *See* Paper 84, 5 (“Team Worldwide objects to the Reply Declaration of Joseph J. Beaman, Jr. (Exhibit 1625), which mischaracterizes Exhibit 2101 and/or exceeds the proper scope of reply”); Paper 95, 3–4 (contending that portions of Ex. 1625 “mischaracterizes Patent Owner’s early expert testimonial evidence (Exhibit 2101) and/or exceeds the proper scope of reply”). Accordingly, Patent Owner does not identify an evidentiary basis to exclude the evidence. Also, neither the motion nor the objection identifies, with particularity, those portions of Dr. Beaman’s declarations to be excluded, as Patent Owner’s citations were presented as exemplary only. *See id.*

c. Exhibits 1651–1654 and 1679

Patent Owner argues that Exhibits 1651–1654 should be excluded as hearsay, are irrelevant, and lack proper foundation. Paper 95, 5. Patent Owner also argues that Exhibit 1679 does not lay the proper foundation for these exhibits. *Id.* at 8.

We deny Patent Owner’s motion as to these exhibits as moot, as we do not rely on them in this Decision. *See* Trial Practice Guide Update, 17 (“In the Board’s experience, consideration of the objected-to evidence is

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often unnecessary to resolve the patentability of the challenged claims, and the motion to exclude is moot.”).³⁹

d. Exhibit 1166 and references to this exhibit in Ex. 1102

Patent Owner argues that Exhibit 1166 and references to this exhibit in Exhibit 1102 should be excluded, as Exhibit 1166 is an animation that does not accurately or completely represent the evidence underlying the animation. Paper 95, 10–11. We deny Patent Owner’s motion as to this exhibit as moot, as we do not rely on it in this Decision. *See* Trial Practice Guide Update, 17.

e. Exhibit 1111

Patent Owner argues that Exhibit 1111 should be excluded under Federal Rule of Evidence 1002 “as not being an original” and under Federal Rule of Evidence 1003 “as not being an admissible duplicate due to it being an inaccurate copy with portions of the document cut off.” Paper 99, 11 (discussing Ex. 1111, 11 (and “odd numbered pages following that”).

Petitioners respond that “the entire basis for Patent Owner’s argument is that some of the pages of Ex. 1111 appear to have some text cut-off.” Paper 99, 2. According to Petitioners, “[t]he issue Patent Owner complains of is clearly an issue related to the photocopying process.” *Id.* at 2–3. Petitioners also assert that “there is no dispute about the truth or veracity of

³⁹ Although we discuss Exhibits 1651 and 1652 above (*see supra* p. 73–74), we determine that Petitioners have not shown how those exhibits support their argument. Because our discussion above does not rely on Exhibits 1651 and 1652 in the overall determination as to unpatentability, and to maintain a complete record of this proceeding, we do not exclude these exhibits.

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the contents of Exhibit 1[1]11, including the specific pages thereof on which Petitioners' expert relies." *Id.* at 3.

Patent Owner replies that "Petitioners rely on some of the[] pages with missing text. For example, Petitioners and their expert cite to pages 73–78 of Exhibit 1111." Paper 102, 5 (citing Paper 1, 14; Ex. 1002 ¶ 33).

We do not exclude Exhibit 1111. Although some of the odd-numbered pages of Exhibit 1111 do appear to have a portion of the text missing, we do not cite to any odd-numbered pages in the discussion above. Instead, we only discuss pages 78 and 74. Patent Owner has not adequately explained how any of the alleged issues impeded discussion of this exhibit.

Moreover, we also do not exclude Exhibit 1111 because our discussion above does not rely on Exhibit 1111 in determining the *unpatentability* of any of the Challenged Claims (*see supra* § II.F.2), and because we seek to maintain a complete record of this proceeding.

III. CONCLUSION

Upon consideration of the Petition, Response, Reply, Surreply and the evidence of record, we determine that Petitioners (1) have proven by a preponderance of the evidence that claims 1–3, 7–12, 16–18, 22, and 23 of the '394 patent would have been obvious based on Walker and Chaffee, and (2) have proven by a preponderance of the evidence that claims 1–3, 7–12, 16–18, 22, and 23 would have been obvious based on Walker and Goldsmith.⁴⁰ We do not address the alternative ground of whether claims 1–

⁴⁰ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 Notice

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3, 7–12, 16–18, 22, and 23 would have been obvious based on Walker and Parienti.

We also determine that Petitioners (1) have *not* proven by a preponderance of the evidence that claims 4, 6, 19, and 21 would have been obvious based on Walker and Chaffee, (2) have *not* proven by a preponderance of the evidence that claims 4, 6, 19, and 21 would have been obvious based on Walker and Goldsmith, (3) have *not* proven by a preponderance of the evidence that claims 4, 6, 19, and 21 would have been obvious based on Walker and Parienti, and (4) have *not* proven by a preponderance of the evidence that claims 4–6 and 19–21 would have been obvious based on Walker, Chaffee, and Basic Pneumatics; Walker, Goldsmith, and Basic Pneumatics; or Walker, Parienti, and Basic Pneumatics.

IV. ORDER

For the reasons above, it is:

ORDERED that Petitioners have proven by a preponderance of the evidence that claims 1–3, 7–12, 16–18, 22, and 23 are unpatentable;

FURTHER ORDERED that Petitioners have not proven by a preponderance of the evidence that claims 4–6 and 19–21 are unpatentable;

FURTHER ORDERED that, pursuant to 35 U.S.C. § 318(b), upon expiration of the time for appeal of this decision, or the termination of any

Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding, 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

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such appeal, a certificate shall issue canceling claims 1–3, 7–12, 16–18, 22, and 23;

FURTHER ORDERED that the parties shall file, within 10 days of entry of this Decision, a joint motion to seal this Decision, and shall provide, along with the joint motion, an exhibit with a proposed redacted public version of this Decision; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Paper No. 133
Entered: September 11, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEX RECREATION CORPORATION and BESTWAY (USA) INC.,
Petitioners,

v.

TEAM WORLDWIDE CORPORATION,
Patent Owner.

Case IPR2018-00872
Patent 7,246,394 B2

Before BEVERLY M. BUNTING, JAMES J. MAYBERRY, and
ERIC C. JESCHKE, *Administrative Patent Judges*.

MAYBERRY, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

ORDER
Denying Petitioners' Motion to Exclude
Denying Patent Owner's Motion to Exclude
37 C.F.R. § 42.64

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I. INTRODUCTION

Intex Recreation Corp., Bestway (USA) Inc., Walmart Inc., Wal-Mart Stores Texas, LLC, Wal-Mart.com USA LLC, and Sam's West, Inc. d/b/a Sam's Club (collectively, "Petitioners"), filed a Petition ("Pet.") requesting *inter partes* review of claims 1–12 and 16–23 (the "Challenged Claims") of U.S. Patent No. 7,246,394 B2 (Ex. 1201, the "'394 patent"). Paper 1.¹ Patent Owner, Team Worldwide Corp., filed a Preliminary Response ("Prelim. Resp.") to the Petition. Paper 8. We instituted trial on all claims and grounds. Paper 14 ("Dec. on Inst.").

After we instituted trial, Patent Owner filed a Patent Owner Response. Paper 50 ("PO Resp.").² Petitioners filed a Reply to the Patent Owner Response. Paper 77 ("Reply").³ Patent Owner filed a Sur-Reply to the Reply. Paper 89 ("Sur-Reply").⁴

Both Petitioners and Patent Owner filed motions to exclude evidence. Papers 94, 96. Both parties filed oppositions and replies to the respective motions. Papers 99, 100, 102, 103.

¹ The Petition indicates that, along with Petitioners, the following entities are real parties-in-interest: Intex Development Company Ltd., Intex Industries (Xiamen) Co., Ltd., Intex Marketing Ltd., Intex Trading Ltd., Bestway Global Holdings, Inc., Bestway (Hong Kong) International, Ltd., Bestway Inflatables & Materials Corp., Bestway (Hong Kong) Enterprise Co. Ltd., Bestway (Nantong) Recreation Corp., The Coleman Company, Inc., and Newell Brands Inc. Pet. 1.

² A public version of the Patent Owner Response was filed as Paper 51.

³ A public version of the Reply was filed as Paper 78.

⁴ A public version of the Sur-Reply was filed as Paper 90.

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A consolidated oral hearing for *inter partes* review proceedings IPR2018-00870, IPR2018-00871, and IPR2018-00872 was conducted on June 7, 2019, and the record includes a transcript of the hearing. Paper 123 (“Tr.”).⁵ An oral hearing for IPR2018-00875, which concerns a related patent, was also conducted on June 7, 2019, and the record contains a transcript of that hearing. Paper 126.⁶

On June 18, 2019, we granted a joint motion to terminate the proceeding as to the Walmart entities (Walmart Inc., Wal-Mart Stores Texas, LLC, Wal-Mart.com USA LLC, and Sam’s West, Inc. d/b/a Sam’s Club). Paper 120. Accordingly, Intex Recreation Corp. and Bestway (USA) Inc. are the sole remaining “Petitioners.”

Petitioners rely on the declaration testimony of Dr. Joseph Beaman (Exs. 1202, 1625), Mr. W. Todd Schoettelkotte (Ex. 1649), and Mr. Ryan Slate (Ex. 1650). Patent Owner relies on the declaration testimony of Dr. Glen Stevick (Ex. 2229) and Dr. Stephen Becker (Ex. 2638).

The Board has jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we conclude that that the Petitioners have not proven by a preponderance of the evidence that the Challenged Claims are unpatentable.

⁵ A public version of the transcript was filed as Paper 122.

⁶ A public version of the transcript was filed as Paper 125.

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A. Related Matters

The parties indicated that the '394 patent was the subject of an infringement suit in the U.S. District Court for the Eastern District of Texas, in a case styled *Team Worldwide Corp. v. Walmart, Inc. et al.*, No. 2-17-cv-00235-JRG (the "Litigation"). *See* Pet. 1–2; Paper 6, 1. The Litigation was dismissed because of settlement. *See* Paper 109, 1.

Petitioners also identify filed petitions for *inter partes* review of U.S. Patent Nos. 9,211,018 (the "'018 patent") and 7,346,950 (the "'950 patent"), which are asserted in the Litigation, and additional petitions directed to the '394 patent. *See* Pet. 2; Paper 6, 1 (identifying IPR2018-00870, IPR2018-00871, IPR2018-00873, and IPR2018-00874 as challenging the '394 patent; IPR2018-00875 as challenging the '950 patent; and IPR2018-00859 as challenging the '018 patent).

Patent Owner indicates that additional lawsuits involving the '394, '950, and '018 patents, have been filed: *Team Worldwide Corp. v. Macy's, Inc. & Macys.com, LLC*, No. 2:19-cv-00099-JRG (E.D. Tex.); *Team Worldwide Corp. v. Target Corporation & Target Brands, Inc.*, No. 2:19-cv-00100-JRG (E.D. Tex.); *Team Worldwide Corp. v. The Home Depot, Inc.*, No. 2:19-cv00098-JRG (E.D. Tex.); *Team Worldwide Corp. v. Dick's Sporting Goods, Inc.*, No. 2:10-cv-00097-JRG (E.D. Tex.); *Team Worldwide Corp. v. Costco Wholesale Corp.*, No. 2:19-cv-00096-JRG (E.D. Tex.); *Team Worldwide Corp. v. Bed Bath & Beyond Inc.*, No. 2:19-cv-00095-JRG (E.D. Tex.); *Team Worldwide Corp. v. Amazon.com, Inc. and Amazon.com LLC*, No. 2:19-cv-00094-JRG (E.D. Tex.); *Team Worldwide Corp. v. Ace Hardware Corp.*, No. 2:19-cv-00093-JRG (E.D. Tex.); and *Team Worldwide*

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Corp. v. Academy, Ltd. d/b/a Academy Sports + Outdoors, No. 2:19-cv-00092-JRG (E.D. Tex.). Paper 109, 2–3; *see also* Paper 116, 3–4 (providing Petitioners’ updated mandatory notices with respect to the newly-filed lawsuits). Patent Owner indicates that these lawsuits have been stayed pending the results of this and related *inter partes* review proceedings. Paper 109, 3.

B. The ’394 Patent

The ’394 patent “relates in general to an inflatable product provided with an electric air pump.” Ex. 1201, 1:14–15. According to the ’394 patent, prior air mattresses included inflatable chambers that “are inflated by an electric air pump . . . , which is separately provided, requiring users to carry two items, the air mattress itself, and an electric air pump” such that “[i]nconvenience results, especially for outdoor use.” *Id.* at 1:17–24. The ’394 patent, in contrast, “provides a modified air mattress, which has a built-in electric air pump eliminating the need for an external pump.” *Id.* at 1:25–27. Figure 1A is reproduced below:

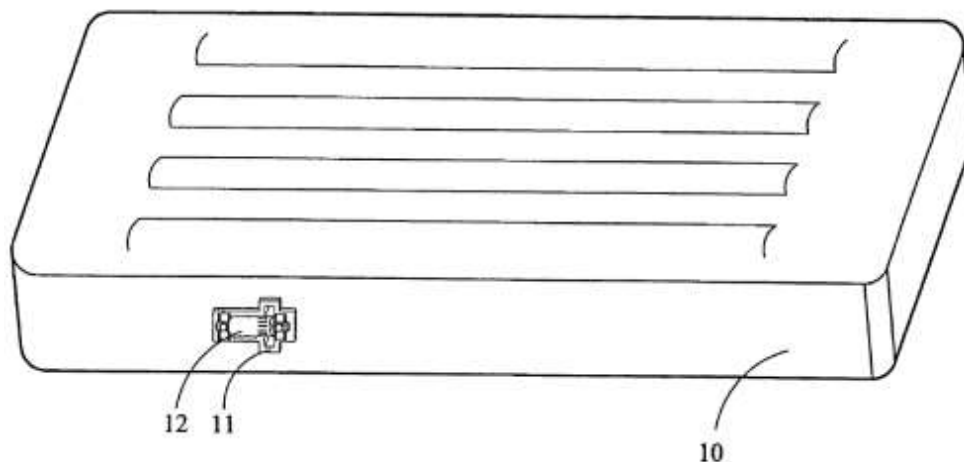


FIG. 1A

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Id., Fig. 1A. Figure 1A depicts “a perspective diagram of an inflatable product,” which includes inflatable chamber 10, pump seat 11, and air pump 12. *Id.* at 1:50–51, 3:15–21. Figures 3A and 3B are reproduced below:

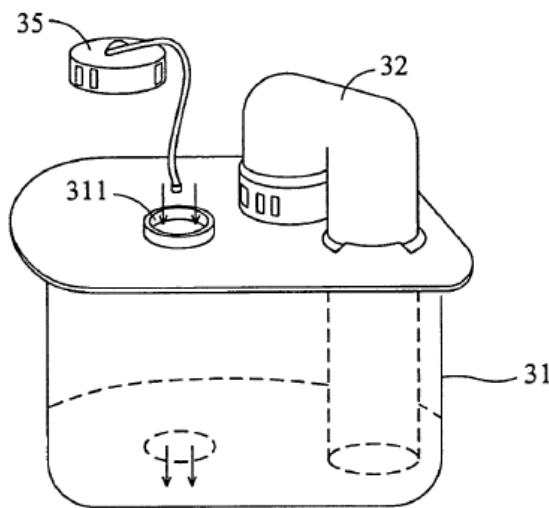


FIG. 3A

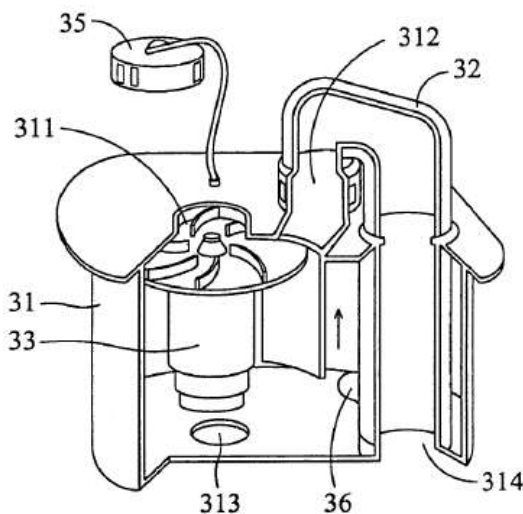


FIG. 3B

Id., Figs. 3A, 3B. Figure 3A depicts an air pump of an embodiment of an inflatable product (as shown, for example, in Figure 1A) during inflation. *See id.* at 1:66–67. Figure 3B depicts the air pump of Figure 3A with portions of certain structures removed. *See id.* at 2:1–2. Figures 3A and 3B show, among other aspects, housing 31, fan and motor 33, switching pipe 32, flap 36, and cover 35. *Id.* at 4:13–16. For inflation, “the switching pipe 32 is connected to the air outlet 312 on the top surface of the housing 31” and “cover 35 is removed from the air intake 311.” *Id.* at 4:22–25. In this configuration, “[t]he inflatable product (not shown) is inflated by the fan and motor 33” as “[a]ir flows through the air intake 311 and the air outlet 313, and into the inflatable product.” *Id.* at 4:25–28.

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Figures 3C and 3D are reproduced below:

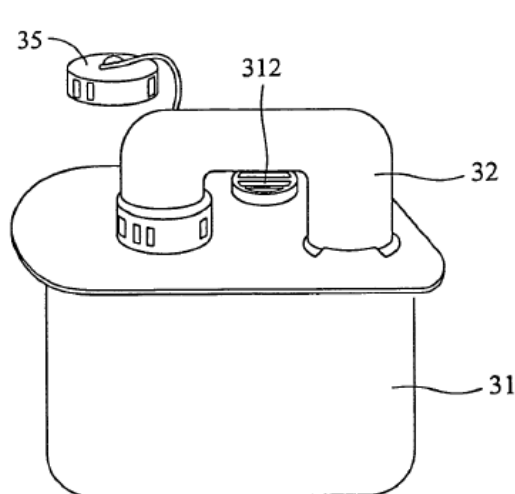


FIG. 3C

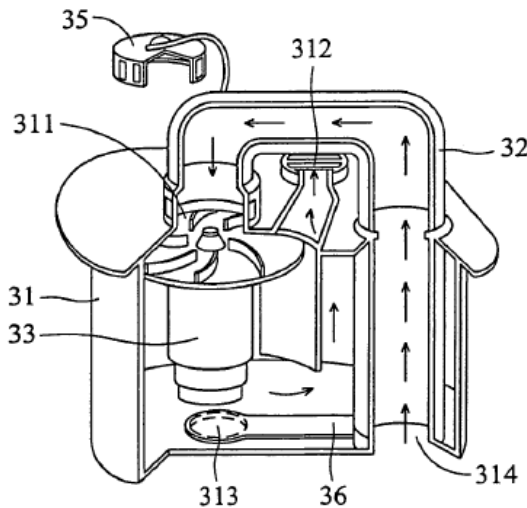


FIG. 3D

Id., Figs. 3C, 3D. Figure 3C depicts an air pump of an embodiment of an inflatable product during deflation. *See id.* at 2:3–4. Figure 3D depicts the air pump of Figure 3C with portions of certain structures removed. *See id.* at 2:5–6. For deflation, “the switching pipe 32 is switched from the air outlet 312 to the air intake 311 on the top surface of the housing 31” and “the flap 36 follows the switching pipe 32 to rotate to close the air outlet 313 on the bottom surface of the housing 31.” *Id.* at 4:29–33. In this configuration, “air in the inflatable product is evacuated by the fan and motor 33” along the path indicated by arrows such that “[a]ir flows through the air intake 314, the switching pipe 32 and the air intake 311, and into the housing 31” and “out from the air outlet 312.” *Id.* at 4:33–38.

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C. Challenged Claims

Of the Challenged Claims, claims 1 and 16 are independent claims.

Ex. 1201, 8:24–38, 9:38–10:19. Claim 1 is representative and reproduced below.

1. An inflatable product including:
 - an inflatable body;
 - a fan and motor assembly for pumping air;
 - a housing built into the inflatable body, the housing having an interior region; and
 - an air conduit disposed at least in part in the housing, the air conduit being movable between a first position and a second position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;
 - wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.

Ex. 1201, 8:24–38.

D. The Applied References

We instituted trial on grounds that rely on the following references:

Miller	US 5,529,377	June 25, 1996	Ex. 1213
Scott	US 4,938,528	July 3, 1990	Ex. 1212
Wu	US 6,698,046 B1	Mar. 2, 2004	Ex. 1205
Pisante	FR 2 583 825 A1	Dec. 26, 1986	Ex. 1263 ⁷

⁷ Exhibit 1263 includes both the original French publication and a certified translation in English. *See, e.g.*, Ex. 1263, 39–40 (providing the translator’s declaration). When citing to Pisante, we cite to the page number of Exhibit 1263 provided by Petitioners.

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E. Asserted Grounds of Unpatentability

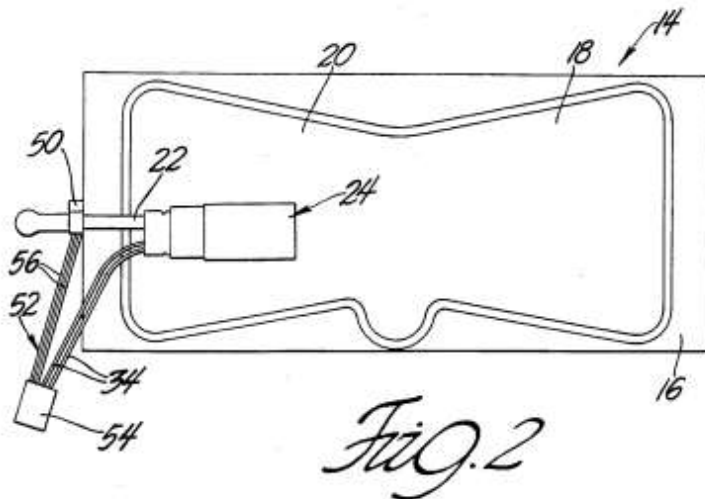
We instituted trial on the following grounds: (1) all Challenged Claims are unpatentable under 35 U.S.C. § 103 over Miller, Scott, and Wu; and (2) all Challenged Claims are unpatentable under 35 U.S.C. § 103 over Miller, Scott, and Pisante. *See* Dec. on Inst. 42, 46, 47, 51; Pet. 23.

F. Overview of the Applied References

We discuss each of the prior art references relied on in the Petition—Miller, Scott, Wu, and Pisante—in turn, below.

1. Miller

Miller, titled “Air Cell Module for Automobile Seat,” issued June 25, 1996, from an application filed June 25, 1993. Ex. 1213, (54), (45), (22). Miller is generally directed “to automotive seats that include air cells to adjust the comfort of the seat.” *Id.* at 1:7–9. We reproduce Miller’s Figures 2 and 3, below.



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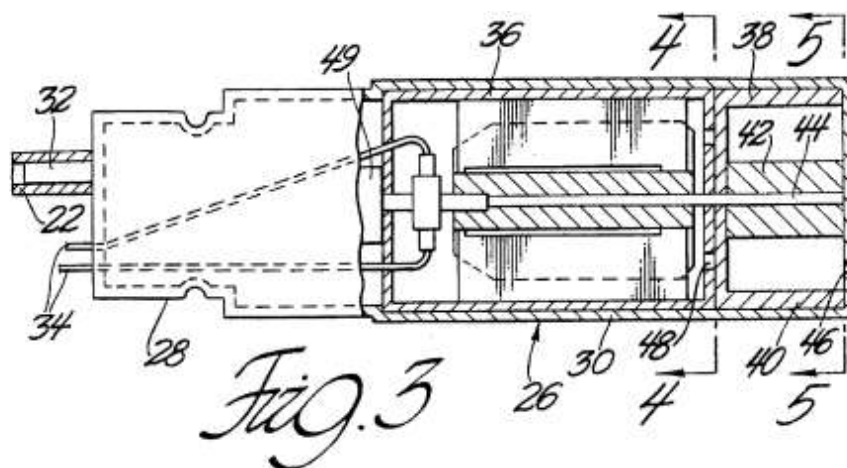


Figure 2 depicts “a front view of the air cell module” of the embodiment of Miller’s Figure 1 and Figure 3 depicts “an enlarged, partially sectioned side view of the air cell module shown in [Figure] 2.” Ex. 1213, 2:64–67. Air cell module 14 is formed by flexible plastic backing member 16 and bow-tie shaped plastic membrane 18 secured to backing member 16 at its periphery. *Id.* at 3:20–24. Air cell module 14 is mounted on a backplate or other suitable support of the automobile seat back. *Id.* at 4:35–36.

Air cell 20 includes plastic air tube 22 that extends through the seam between the backing member 16 and the plastic membrane 18 and welded to backing member 16 and plastic membrane 18 to keep air cell 20 air tight. Ex. 1213, 3:24–30. Air cell module 14 also includes solenoid valve 50, disposed outside of air cell 20 and connected to the exterior end of air tube 22 to control the flow of air to and from air cell 20. *Id.* at 4:13–17.

Air cell module 14 also includes an electric motor driven air pump subassembly 24, which is disposed inside air cell 20, and which is operatively connected to the air tube 22. Ex. 1213, 3:31–38. “[A]ir pump

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subassembly 24 is preferably welded to the backing member 16 but it can be welded to the plastic membrane 18 instead so long as it is held in a relatively fixed location.” *Id.* at 3:34–36.

Subassembly 24 includes wankel-type air pump 38 attached to electric motor 36, which reside, as a unit, within housing piece 30. Ex. 1213, 3:51–55. Control switch 60 is located on the side of the seat to adjust the pressure of the air cell 20. *Id.* at 4:25–27. “The air cell is preferably inflated and deflated by a pump system that uses a reversible electric motor and air pump and a single solenoid valve that are controlled by a two-position switch.” *Id.* at 4:27–30. Miller states that “[t]he advantage of such a system is that the deflation rate is quick and matches the inflation rate. Also the air cell can be fully evacuated and the seat occupant senses power operation on inflation and deflation.” *Id.* at 4:30–34.

Miller discloses a second embodiment that includes electric motor driven air pump subassembly 124 to inflate and deflate air cell 114. Ex. 1213, 4:43–54. Subassembly 124 includes a reversible electric motor 136 connected to reversible air pump 138, such as a conventional vane pump. *Id.* at 4:59–61; *see also* Fig. 6 (depicting subassembly 124 outside of air cell 114).

2. *Scott*

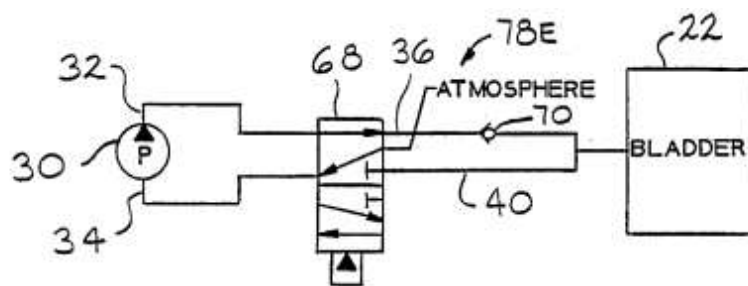
Scott, titled “Seat Assembly with Inflatable Bladder Having a Single Non-Reversible Pump for Inflating and Deflating the Bladder,” issued July 3, 1990, from an application filed April 27, 1989. Ex. 1212, (54), (45), (22). Scott is generally directed “to a vehicle seat assembly having an inflatable bladder in the seat to provide adjustable support for the seat

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occupant and in particular to an improved air delivery system for inflating and deflating the seat bladder having a single, non-reversible pump for both inflating and deflating the bladder.” *Id.* at 1:10–15.

Scott discloses, as part of the background to its invention, that it was known that inflatable bladders for vehicle seats may be deflated by the seat occupant applying pressure to the bladder or by using a pump—either a second pump separate from the pump used to inflate the bladder or a single, reversible pump to inflate and deflate the bladder. *See* Ex. 1212, 1:16–40. Scott discloses that “[t]he two pump system has the added expense of the second pump [and] [a] reversible pump is more expensive than a one-directional pump and is less efficient.” *Id.* at 1:40–43. Scott continues that, because a reversible pump is less efficient than a one-directional pump, “a larger motor is required to produce the same amount of air pressure and volume flow as a one-directional pump.” *Id.* at 1:43–45.

Scott discloses an exemplary one-directional pump for inflating and deflating a bladder in its Figure 12, which we reproduce below.



—FIG. 12

Figure 12 depicts “a pneumatic schematic of a modified form of the air delivery system of” Scott’s invention. Ex. 1212, 2:49–50. Air delivery

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system 28E⁸ includes valve 68, which enables pump 30 to both inflate and deflate bladder 22. *See id.* at 5:57–66. As depicted in Figure 12, pump inlet 34 is in communication with the atmosphere through valve 68, and outlet conduit 36 is open through valve 68 to check valve 70 and bladder 22. In this configuration of valve 68, pump 30 would inflate bladder 22. *Id.*, Fig. 12. Check valve 70 prevents air from leaking from the bladder 22 through valve 68 and pump 30 to atmosphere. *Id.* at 5:53–56. In operation, pump 30 pumps air through conduit 36 and the air pressure from the pump opens check valve 70 to allow air to flow into bladder 22. *Id.* at 5:57–60. Air does not leave bladder 22 as conduit 40 is blocked at valve 68, as seen in Figure 12. *Id.* at 5:60–61.

To deflate bladder 22, valve 68 moves to a second position that brings pump inlet 34 into communication with conduit 40 and pump outlet 32 in communication with the atmosphere. Ex. 1212, 5:62–66. In Figure 12, this configuration corresponds to the rectangular representation of valve 68 moving upwards, so that the bottom half of the depicted valve structure aligns with conduit 40 and the line to atmosphere. *See* Ex. 1271 (providing an animation showing how the system of Scott’s Figure 12 operates).

3. Wu

Wu, titled “Air Mattress Control Unit,” issued March 2, 2004, from an application filed March 26, 2002 and claiming priority to two provisional applications filed March 26, 2001 and May 17, 2001. Ex. 1205, (54), (45),

⁸ Scott’s Figure 12 mistakenly identifies the air delivery system as “78E.” *Compare* Ex. 1212, Fig. 12, *with id.* at 5:45–6:2.

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(22), (60). Wu is generally directed to a system for controlling air flow into chambers of an air mattress. *Id.* at 1:12–14. We reproduce Wu's Figures 1 and 2, below.

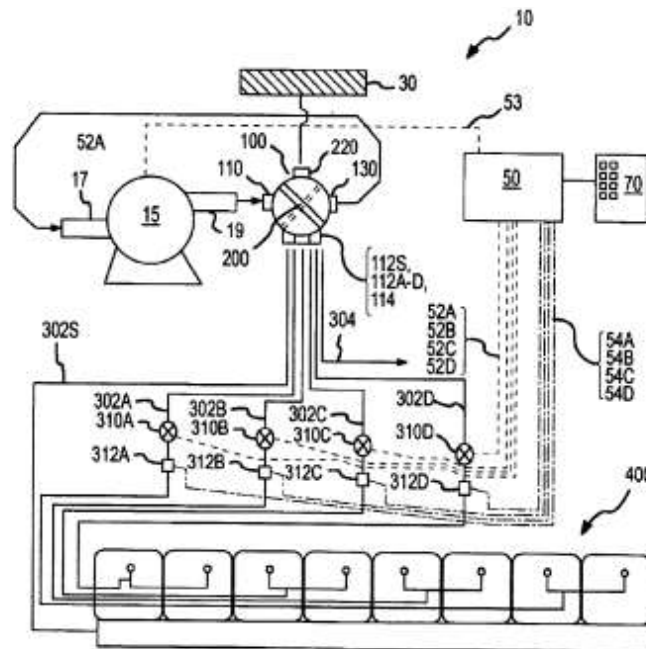


FIG. 1

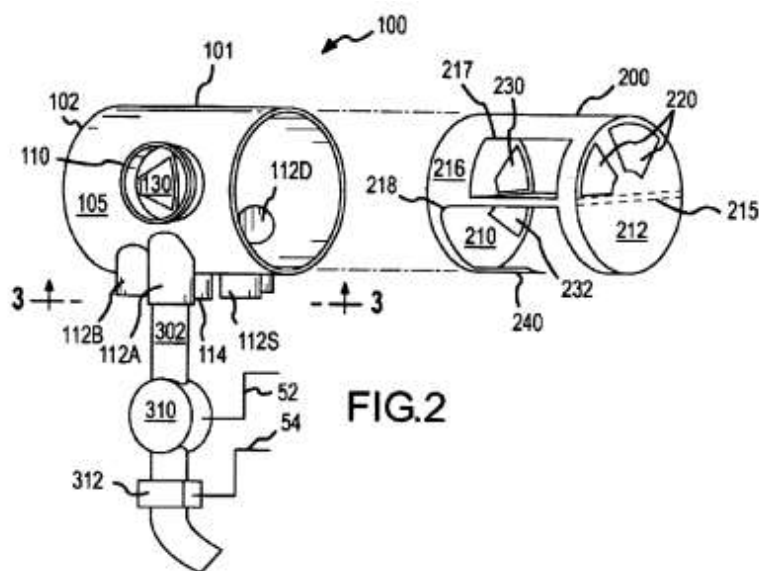


FIG. 2

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Figure 1 depicts Wu's system and Figure 2 depicts "a perspective view of the rotary valve of" Wu's system. Ex. 1205, 2:34–37. Relevant to Petitioners' position, Wu discloses two-position rotary valve 100, which allows a one-directional pump (centrifugal fan-type blower 15) to both inflate and deflate air mattress 400. *See id.* at 2:63–3:29, 4:48–59.

As illustrated in Figure 2, rotary valve 100 includes cylindrically shaped valve housing 101 with outer wall 105 that includes inlet port 110 that connects with exhaust port 19 of blower 15. Ex. 1205, 4:61–66. Outer wall 105 also includes exhaust ports that supply air to air mattress 400's air supply ports. *Id.* at 4:66–5:2.

Gate member 200 fits within valve housing 101 and includes two end walls that close gate member 200 within valve housing 101. Ex. 1205, 5:9–19. Horizontal wall 215 divides gate member 200 into two sections. *Id.* at 5:19–22. The port arrangement in gate member 200 and valve housing 101 allows the valve to operate in a first position that allows air to be delivered to air mattress 400, and a second position that allows for air mattress 400 to be deflated. *Id.* at 5:44–48.

4. *Pisante*

Pisante, titled "Hand-Operated Device for the Localized Production of a Fluid Stream," published December 26, 1986. Ex. 1263, 20. Pisante is generally directed to a small device in which a one-direction pump can be used, alternatingly, for blowing air or suction. *Id.* at 21, 5–7. Pisante's Figures 1, 3, and 4 are reproduced below.

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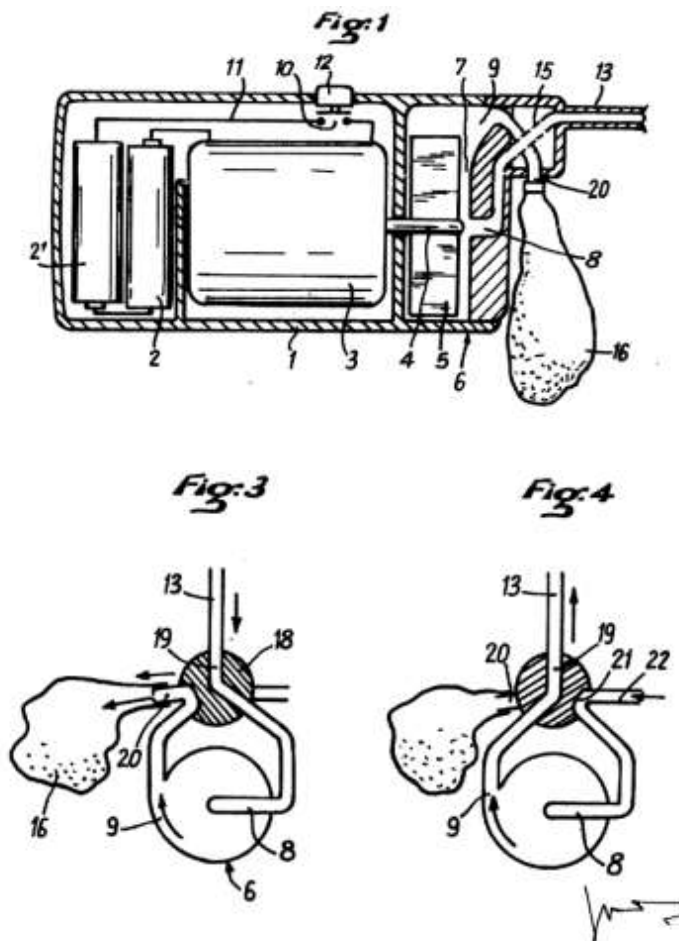


Figure 1 depicts “a cross-sectional view of the device according to” Pisante’s invention. Ex. 1263, 26, 28–29. Figure 3 and Figure 4 provide “views of the operation of the three-way ball valve type rotating switching device.” *Id.* at 27, 5–6. Pisante’s device includes shell 1 and electric motor 3, with output shaft 4 to drive rotor 5 of blower 6. *Id.* at 27, 14–17. The device also includes a switching device, which reverses the flow of air through the device. *Id.* at 27, 6–7.

Rotating valve 15, which is manually rotated using chuck 17, includes barrel 18 with inner channel 19. Ex. 1263, 29, 5–12. As seen in Figure 3,

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rotating valve 15 can position inner channel 19 such that air is drawn into blower or turbine 6 through tube 13 and out into envelope 16. *Id.* at 29, 12–18. Alternatively, as seen in Figure 4, barrel 18 can position inner channel 19 to conduct air drawn in through inlet 22, through blower 6, and out tube 13. *Id.* at 29, 20–29.

II. ANALYSIS

A. *Level of Ordinary Skill in the Art*

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). Petitioners contend that a person having ordinary skill in the art would have had “a bachelor’s degree in mechanical engineering, or an equivalent field” or, alternatively, “an associate’s degree in mechanical engineering, or an equivalent field, and two years of practical experience in product design and manufacturing.” Pet. 7 (citing Ex. 1202 ¶¶ 26–27).

Patent Owner contends that a person having ordinary skill in the art would have had “a bachelor’s degree in mechanical engineering or an equivalent field” or, alternatively, “a designer with at least two years of experience in mechanical and electrical design aspects of inflatable products having electric air pumps.” PO Resp. 29 (citing Ex. 2229 ¶¶ 21–27). That is, Patent Owner contends that, equivalent to having a bachelor’s degree in mechanical (or similar) engineering, is having specific experience in the mechanical and electrical aspects of inflatable products with electric pumps.

We find both parties assert very similar definitions of the level of ordinary skill in the art. Both definitions include, as one alternative, a

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degreed mechanical engineer or the like. We agree with Patent Owner that an individual⁹ without a bachelor's degree in mechanical engineering would be a person of ordinary skill in the art so long as she had experience with inflatable products with electric motors, and we adopt Patent Owner's formulation of the level of ordinary skill in the art.

We base our determination on a review of the prior art of record concerning inflatable products, small pumps for inflating or deflating products, and valves for small pumps. *See, e.g.*, Exs. 1217–1254 (providing certain prior art); *see also* Ex. 1202 ¶¶ 51–106 (discussing the state of the art for inflatable products and pumps). We determine, based on the review of this evidence, that Patent Owner's proposed definition is consistent with the level of ordinary skill reflected in this evidence. As such, based on the complete record, we find that a person of ordinary skill in the art would have had “a bachelor's degree in mechanical engineering or an equivalent field” or, alternatively, “a designer with at least two years of experience in mechanical and electrical design aspects of inflatable products having electric air pumps.”

Further, we note that our patentability and claim construction analyses presented below would reach the same findings and determinations under either party's definition of the level of ordinary skill in the art. *Cf.* Ex. 2229

⁹ Patent Owner uses the term “designer” in defining the level of skill in the art for an individual without a bachelor's degree in mechanical engineering. We do not discern any special meaning for that term based on Patent Owner's assertions, other than a person with the indicated experience. *See* PO Resp. 29; Ex. 2229 ¶¶ 21–27.

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¶ 26 (“My opinions expressed in this declaration remain the same under either definition of a [person having ordinary skill in the art].”); Ex. 1625
 ¶ 11 (“Despite my initial opinion, I agree with the Board’s . . . definition of a [person having ordinary skill in the art].”).

B. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2017). Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Also, we are careful not to read a particular embodiment appearing in the written description into the claim if the claim language is broader than the embodiment. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993) (“[L]imitations are not to be read into the claims from the specification.”).

The claim construction standard to be employed in an *inter partes* review recently changed to the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005). *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (now codified at 37 C.F.R. § 42). That new standard, however, applies only to proceedings in which the petition was filed on or after November 13, 2018. The Petition in this proceeding was filed on March 30, 2018, and we apply the broadest reasonable interpretation claim construction standard that

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was in effect at that time.¹⁰ We invited the parties to address the impact, if any, of the proposed change to the claim construction standard upon the present proceeding. *See* Dec. on Inst. 26 n.8. Neither Patent Owner nor Petitioners indicate that any claim term would have a different construction under the *Phillips* standard as compared to the broadest reasonable construction standard.

We note that, in two situations, the proper interpretation of a claim term departs from the ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure—when the patentee acted as its own lexicographer or disavowed certain claim scope. *See Luminara Worldwide, LLC v. Liown Elecs. Co.*, 814 F.3d 1343, 1353 (Fed. Cir. 2016). “The standards for finding lexicography and disavowal are ‘*exacting*.’” *Id.* (emphasis added). “To act as a lexicographer, a patentee must ‘clearly set forth a definition of the disputed claim term’ and ‘clearly express an intent to redefine the term.’” *Id.* Disavowal (or disclaimer) requires that the patentee make it clear, either in the Specification or in the prosecution history, “that the invention does not

¹⁰ Patent Owner recognizes that the change in claim construction standard does not apply to this proceeding, but “submits that *Phillips* has been recognized as the correct standard and should be applied in this case.” PO Resp. 15 n.3. Patent Owner does not identify any authority, either in the case law or Board decisions, that would allow us to apply the *Phillips* standard to this case, nor does Patent Owner explain why the standard in *Phillips* is “the correct standard,” and, by implication, that the broadest reasonable interpretation is the incorrect standard. *See id.* In accordance with our rules, we apply the appropriate claim construction standard dictated for the current proceeding, the broadest reasonable interpretation.

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include a particular feature.” *Id.* “While such disavowal can occur either explicitly or implicitly, *it must be clear and unmistakable.*” *Id.* (emphasis added).

Petitioners provide express constructions for three terms: “inflatable body,” “pipe,” and “fan.” Pet. 23–29. Patent Owner provides an express construction for an additional term: “built into.” PO Resp. 16–29. We need address the constructions of only “built into” and “fan” to resolve the parties’ disputes. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017), *cert. denied*, 138 S. Ct. 1695 (Apr. 30, 2018) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)) (indicating that “we need only [expressly] construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”).

1. “built into”

In our Decision on Institution, we construed the term “built into” to mean “integrated into and not detachable from.” Dec. on Inst. 22–26. Patent Owner remarks that our construction matches its proposed construction. PO Resp. 16–17. Petitioners do not offer a different construction in their Reply. *See Reply; see also id.* at 1–2 (addressing whether Miller’s pump is built into the wall of cell module 14, but not addressing the construction of “built into”).

The parties do dispute how our construction is applied to the prior art in these proceedings and we address this dispute in our analysis of Ground 1, below.

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Thus, based on the complete record, we adopt the reasons set forth in the Decision on Institution for purposes of this Final Written Decision in construing “built in” to mean “integrated into and not detachable (or readily removed) from.” Dec. on Inst. 22–26.

2. “*fan*”

In the Decision on Institution, we preliminarily determined that the term “fan” is entitled to its plain and ordinary meaning, “a device that alters air pressure through rotation, where the rotational action acts on the air to create a flow of air.” Dec. on Inst. 27. Petitioners agree with our construction. Reply 11 (“Petitioners agree with this construction.”); *see also* Ex. 1625 ¶ 55 (“I agree with this construction.”). Patent Owner contends that the construction from the Decision on Institution is overly broad, as it captures certain air pumps, such as compressors, that a person having ordinary skill in the art would not have considered as being a fan. PO Resp. 23–24.

Patent Owner contends that the proper construction of the term “fan” is “a device that moves air by continually adding energy to increase the air velocity to values greater than those occurring at the discharge of the fan and does not apply force to movable boundaries of enclosed discrete volumes to move the air.” PO Resp. 22. Essentially, Patent Owner argues that, when properly construed, the scope of the term “fan” excludes positive displacement pumps. *See id.* at 25. Patent Owner argues that a person having ordinary skill in the art would have understood that there is a continuum of air-moving devices, which includes fans, blowers, and positive displacement compressors, and fans and positive displacement compressors

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are on the opposite ends of the continuum. *Id.* at 25–26 (referencing Ex. 2229 ¶ 149).

Patent Owner explains that pumps can be divided between two types—dynamic pumps and displacement pumps. PO Resp. 26. Patent Owner continues that, with dynamic pumps, “energy is continuously added to increase the fluid velocities within the machine to values greater than those occurring at the discharge such that subsequent velocity reduction within or beyond the pump produces a pressure increase.” *Id.* (referencing Ex. 2247, 8–9). According to Patent Owner, with displacement pumps, “energy is periodically added by application of force to one or more movable boundaries of any desired number of enclosed, fluid-containing volumes, resulting in a direct increase in pressure up to the value required to move the fluid through valves or ports into the discharge line.” *Id.* (referencing Ex. 2247, 8–9). Patent Owner adds that centrifugal pumps are dynamic pumps and that all of the fans in the ’394 patent are centrifugal pumps. *Id.* (referencing Ex. 2247, 12; Ex. 2229 ¶ 46).

Petitioners argue that our preliminary construction of fan in the Decision on Institution is “fully supported” by the ’394 patent. Reply 12 (referencing Ex. 1201, 4:25–28, 4:63–5:5, 8:2–13; Ex. 1625 ¶ 60). Petitioners argue that fan 155 disclosed in the ’394 patent at Figures 10A and 10B is a positive displacement pump. *Id.* (referencing Ex. 1201, Figs. 10A–B, 7:66–8:6; Ex. 1625 ¶¶ 62–70). Specifically, Petitioners argue that a person having ordinary skill in the art would have understood that fan 155 is a rotary vane pump and this broad use of the term “fan” demonstrates that the patentee intended to instill breadth to the term. *Id.* at 12–13.

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To support their contention that fan 155 is a rotary vane pump, Petitioners first argue that fan 155 is an alternative embodiment that replaces a bellows pump, which is a positive displacement pump and that a person having ordinary skill in the art would have understood that you would replace one positive displacement pump for another. Reply 13 (referencing Ex. 1625 ¶¶ 63–64).

Second, Petitioners argue that the eccentric location of fan 155 “is a distinct characteristic of a positive-displacement rotary vane pump.” *Id.* at 14 (referencing Ex. 1213, 4:59–64, Fig. 8; Ex. 1625 ¶ 66). Petitioners explain that the eccentricity permits the pump to compress air to move the air through the pump. *Id.* (referencing Ex. 1213, 4:59–64; Ex. 1625 ¶ 66). Third, according to Petitioners, the position of air inlet 152 and air outlet 153 on the circumference of reservoir 151 also supports their position that fan 155 is a rotary vane pump. *Id.* (referencing Ex. 1625 ¶ 67).

Petitioners recognize that Figures 10A and 10B do not depict fan 155 with vanes. Reply 15. Petitioners argue that a person having ordinary skill in the art would have understood that the vanes are an inherent feature of fan 155. *Id.* (referencing Ex. 1625 ¶ 67). Petitioners add that, if fan 155 was not a positive displacement pump, then it is unclear how the fan would actually work. *Id.* at 16 (referencing Ex. 1625 ¶¶ 68–69). Petitioners remark that Patent Owner does not provide any “meaningful analysis of the fan 155 of Fig. 10B or how it would operate if it were not a positive displacement pump.” *Id.*

Patent Owner counters that Petitioners’ reliance on the parenthetical phrase “air pressure rotator” in describing fan 155 does not amount to a

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lexicographic definition of the term “fan.” PO Resp. 23. Patent Owner also argues that Dr. Beaman agrees that, without blades or vanes, fan 155 would not be a positive displacement pump. *Id.* at 24. Patent Owner also argues that “a construction of ‘fan’ that includes a subset of positive displacement pumps is not supported by the ‘394” patent. Sur-Reply 10.

With this backdrop, we look anew at the construction of the term “fan.” We begin with the language of the claim itself. *See, e.g., Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc) (“[T]he context in which a term is used in the [claim at issue] can be highly instructive.”). Claim 1 recites “a fan and motor assembly for pumping air” and further recites “the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position.” Ex. 1201, 8:26, 8:32–35. The language of the claim informs us that the fan, when coupled with a motor, pumps air to inflate and deflate the inflatable body. The language in independent claims 13 and 16 recite similar subject matter. *See id.* at 9:10–31, 9:38–10:19. We discern nothing in dependent claims that would provide additional insight of the meaning of “fan.”

In construing terms, “the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Phillips*, 415 F.3d at 1313. Indeed, the specification is “the single best guide to the meaning of a disputed term” and “[u]sually, it is dispositive.” *Id.* Claims must be construed “in view of the specification, of which they are a part.” *Id.* at 1315; *see also In re Suitco Surface, Inc.*, 603

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F.3d 1255, 1260 (Fed. Cir. 2010) (“[C]laims should always be read in light of the specification and teachings in the underlying patent.”). Our reviewing court has “held that ‘[e]ven when guidance is not provided in explicit definitional format, the specification may define claim terms by implication such that the meaning may be found in or ascertained by a reading of the patent documents.’” *In re Abbott Diabetes Care Inc.*, 696 F.3d 1142, 1150 (Fed. Cir. 2012) (quoting *Irdeto Access, Inc. v. Echostar Satellite Corp.*, 383 F.3d 1295, 1300 (Fed. Cir. 2004)).

The Specification uses the term “fan” consistently; that is, the fan, in conjunction with a motor, is used to inflate or deflate the inflatable product. *See, e.g.*, Ex. 1201, 3:52–54, 3:64–65 (“[A]ir pump 22[, which includes fan and motor 223,] pumps air into the inflatable product.”), 4:25–35 (“The inflatable product (not shown) is inflated by the fan and motor 33. Air flows through the air intake 311 and the air outlet 313, and into the inflatable product. . . . The air in the inflatable product is evacuated by the fan and motor 33.”), 4:63–5:5 (“To inflate the back support 42, the user . . . activate[s] the fan and motor 435 . . . [, t]hen, outside air is pumped into the back support 42 through the air intake 4301 and air outlet 4302 of the air pump assembly 43.”), 6:2–4 (“The air pump assembly 63 has a fan and motor 633, a valve switch 631 and a cantilever arm 632 connected to the valve switch 631.”), 6:49–67 (“The air pump assembly includes . . . a fan and motor 82 received in the pack 81. . . . When the slider 87 is moved to the right, . . . the fan and motor 82 is activated to rotate in a normal direction. When the slider 87 is moved to the left, . . . the fan and motor 82 is activated to rotate in a reverse direction.”), 8:2–13 (“The air pump 150 includes . . . a

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motor 154 provided . . . to rotate the fan 155. . . . During operation, air is pumped into the reservoir 151 through the air intake 152 and then pumped out through the air outlet 153 . . . to inflate the umbrella.”). Also, when depicted, the fan is attached to the motor in an axial arrangement, indicating to one of skill in the art that the motor includes a shaft that rotates the fan component. *See id.*, Figs. 2B, 3B, 3D, 4C, 4F, 8C, 10A, 10B. For example, Figure 4C depicts a short segment of a shaft between what is the fan and motor. *Id.*, Fig. 4C.

As we explain in greater detail below, we also find that the pump configuration depicted in 10B is a positive displacement pump. We reproduce Figure 10B, below.

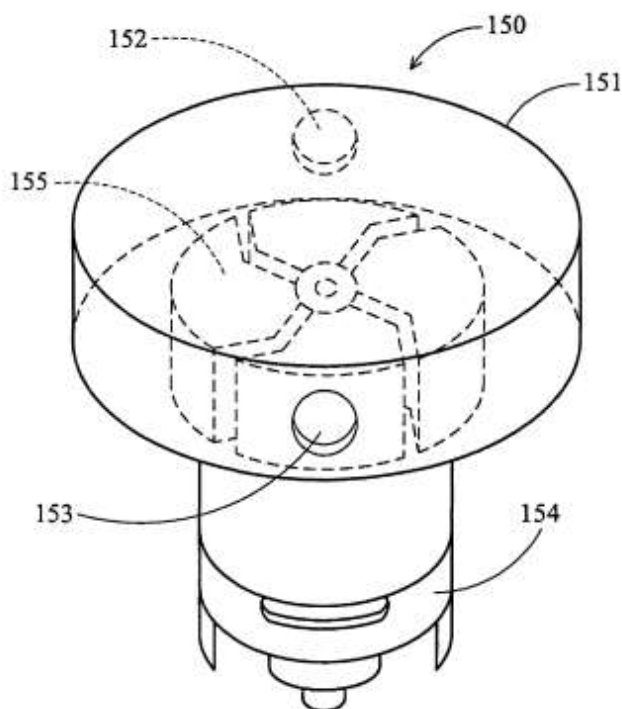


Figure 10B depicts “a perspective diagram of a fan assembly of F[igure] 10A.” Ex. 1201, 3:7–8. The Specification expressly states that fan 155 is

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eccentrically received in reservoir 151, which is a characteristic of a positive displacement pump. *See id.* at 8:2–6; Ex. 1625 ¶ 65. Also, the Specification expressly identifies fan 155 as an “air pressure rotator,” a label that supports a finding that fan 155 is part of a positive displacement pump, which moves air by increasing its pressure through rotation. *See* Ex. 1201, 8:3–4; Ex. 2247, 9. Also, inlet 152 and outlet 153 are spaced apart and positioned on the circumference of reservoir 151, also a characteristic of a positive displacement pump. *See* Ex. 1625 ¶ 67.

We recognize that a positive displacement pump would require some structure, such as vanes, to capture a volume of air and compress that volume of air and that this structure is not shown in Figure 10B. *See* PO Resp. 24; Ex. 1625 ¶ 67; Ex. 2229 ¶ 48. However, we do not consider this omission in the drawing dispositive when considering the totality of the evidence.¹¹ *See, e.g., Bos. Sci. Corp. v. Johnson & Johnson*, 647 F.3d 1353, 1366 (Fed. Cir. 2011) (“Because the specification is viewed from the perspective of one of skill, in some circumstances, a patentee may rely on information that is ‘well-known in the art’ for purposes of” having an adequate disclosure).

In reaching our understanding of the disclosure of the ’394 patent with respect to Figure 10B, we credit Dr. Beaman’s testimony, in part, because we find the testimony consistent with other information of record on positive displacement pumps. *See* Ex. 1625 ¶¶ 59–66; Ex. 2229 ¶ 48; Ex. 2247, 9.

¹¹ Indeed, many of the fans depicted in the ’394 patent do not show vanes or impellers. *See, e.g.,* Ex. 1201, Figs. 2B, 4C, 4F.

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We do not credit Patent Owner’s assertion that “[a]ll of the fans of the ’394 patent . . . are centrifugal pumps” as this assertion is not adequately supported. *See* PO Resp. 26 (referencing Ex. 2229 ¶ 46).¹² Dr. Stevick does not adequately explain how fan 155 would operate as a centrifugal pump given the locations of the air inlet and air outlet. *See* Ex. 1625 ¶ 69 (“It is also unclear how fan 155 would operate if it were not a positive displacement pump.”).

Given that the patent drafter decided to use the term “fan” in the Specification to broadly encompass a rotating positive displacement pump, we determine that Patent Owner’s proposed construction is not consistent with how the term “fan” is used in the Specification. To be clear, we do not determine that the patentee acted as its own lexicographer and *expressly* defined the term “fan” in the Specification. Instead, “the ‘[v]aried use of a disputed term in the written description demonstrates the breadth of the term rather than providing a limited definition.’” *Marine Polymer Techs., Inc. v. HemCon, Inc.*, 672 F.3d 1350, 1370 (Fed. Cir. 2012) (quoting *Johnson Worldwide Assocs., Inc. v. Zebco Corp.*, 175 F.3d 985, 991 (Fed. Cir. 1999)).

The prosecution history does not provide much additional information on the term “fan.” During prosecution, the examiner rejected independent claim 1 as anticipated by U.S. Patent No. 6,332,760 (the “’760 patent”). Ex. 1203, 63. The examiner identified the ’760 patent’s electric pump 30 as corresponding to the recited fan and motor. *See id.*; Ex. 3004 (providing the

¹² Patent Owner likely means ¶ 49.

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'760 patent). The patentee overcame the rejection by arguing that the '760 patent was not prior art. *See* Ex. 1203, 27–28. Still, the examiner's reliance on electric pump 30 (which is not described as having a fan) as corresponding to the recited fan and motor does support an inference that the examiner construed the term “fan” broadly and in a manner included within our construction above.

We have reviewed Patent Owner's extrinsic evidence and do not find it sufficient to change our understanding of the Specification's broad use of the term “fan.” *See* Ex. 2229 ¶¶ 42–51; Ex. 2247; Ex. 2040, 450:9–13, 455:1–8, 455:16–460:1, 462:3–6.

Accordingly, given the breadth of the use of the term “fan” in the Specification, we maintain our construction of the term from the Decision on Institution and find that “fan” means “a device that alters air pressure through rotation, where the rotational action acts on the air to create a flow of air,” as this construction represents the broadest reasonable construction in light of the Specification.

C. Asserted Grounds of Unpatentability

In *inter partes* reviews, a petitioner bears the burden of proving unpatentability of the challenged claims, and the burden of persuasion never shifts to the patent owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail in this proceeding, Petitioners must support their challenge by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). Accordingly, all of our findings and conclusions are based on a preponderance of the evidence.

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Petitioners’ two grounds of unpatentability are based on obviousness.
See Pet. 23.

Section 103(a) [of 35 U.S.C.] forbids issuance of a patent when “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.”

KSR Int’l Co. v. Teleflex Inc., 550 U.S. 398, 406 (2007).

The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when available, secondary considerations, such as commercial success, long felt but unsolved needs, and failure of others. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We address these underlying factual issues below.¹³

1. Ground 1 – the Challenged Claims are allegedly unpatentable over Miller, Scott, and Wu

Petitioners contend that “Miller in combination with Scott in further combination with Wu renders the Challenged Claims obvious.” Pet. 31. We address the Challenged Claims under this ground below.

a. Independent claim 1

i. Limitation-by-limitation analysis of the scope of the prior art and any differences between the claimed subject matter and the prior art

The preamble of independent claim 1 recites “[a]n inflatable product.” Ex. 1201, 8:24. Neither party asserts that the preamble is limiting. *See*

¹³ We address the level of ordinary skill in the art in Section II.A., *supra*.

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Pet. 33 n.4 (“The preamble is not a limitation.”); PO Resp. 33–49 (addressing claim 1 under the first ground, but not the preamble).

Petitioners further assert that Miller does disclose an inflatable product—an automotive seat assembly. Pet. 33 n.4.

Patent Owner states that “Miller is nothing like the ’394 patent.” PO Resp. 32. Patent Owner continues that Miller “deals with a completely enclosed air cell permanently embedded in the interior of a seatback to provide lumbar support” and, in contrast, the ’394 patent “addresses much larger inflatables that are portable and intended to completely deflate and store between uses.” *Id.* at 32–33 (referencing Ex. 2229 ¶ 63). Patent Owner does not direct us to any arguments or evidence that convinces us to narrow the scope of the Challenged Claims to “larger inflatables that are portable and intended to completely deflate and store between uses.” With respect to each of the Challenged Claims, the patentee elected to broadly claim the subject matter as an inflatable product.

Independent claim 1 recites “an inflatable body.” Ex. 1201, 8:25. Petitioners contend that Miller discloses an inflatable body, air cell 20. Pet. 33; *see* Ex. 1213, 3:20–30, 4:44–51, Figs. 1, 2, 6; *see also* Ex. 1202 ¶ 180 (describing Miller’s air cell 20). Petitioners further contend that Miller’s air cell 20 is substantially airtight, “as the purpose of the bladder is to maintain a sense of firmness for relatively extended periods of time.” Pet. 34.¹⁴

¹⁴ We do not need to decide whether the proper construction of the term “inflatable body” requires that body to be substantially airtight. *See* Pet. 27–28; PO Resp. 18–21.

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We find, based on the complete record, that the information in the Petition demonstrates, by a preponderance of the evidence, that Miller discloses an inflatable body. *See* Pet. 33–34; Ex. 1213, 3:20–30, 4:44–51, Figs. 1, 2, 6. Patent Owner does not challenge Petitioners’ contentions with respect to this element.

Independent claim 1 also recites “a fan and motor assembly for pumping air.” Ex. 1201, 8:26. Petitioners contend that Miller discloses air pump assembly 24, which includes Wankel pump 38 and electric motor 36, for pumping air into air cell 20. Pet. 34–35; *see* Ex. 1213, 3:31–33, 3:39–45, 3:51–55; *see also* Ex. 1202 ¶ 183. Petitioners contend that rotor 42 alters air pressure through rotation, making it a fan. Pet. 35 (referencing Ex. 1202 ¶ 183). As Miller describes, crank 44 is driven by electric motor 36 and moves rotor 42 in an orbital manner in housing 40; that is, rotor 42 rotates as it moves along the edges of the two lobes of housing 40. Ex. 1213, 3:62–67, Figs. 3, 5; *see also id.* at 3:55–58 (“The air pump 38 comprises a cup or housing 40 that has a bi-lobular chamber, a triangular rotor 42 disposed in the chamber, and a crank 44 for driving the rotor 42.”); Ex. 1202 ¶ 183 (describing the operation of pump 38).

Patent Owner argues that, even under our construction of “fan,” Miller’s Wankel pump 38 is not a fan because it does not create a flow of air. PO Resp. 34. Patent Owner explains that “[t]here is no ‘flow’ of air from the input port of the pump to the output port because the Wankel pump divides the input and output steps by compressing air in a closed volume as an intermediate step.” *Id.* Patent Owner adds that Dr. Beaman concedes

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that he has never heard of a Wankel pump being referred to as a fan. *Id.* (referencing Ex. 2040, 449:18–450:12).

Petitioners reply that Miller expressly discloses that its pump creates a flow of air to and from the air cell. Reply 11 (referencing Ex. 1213, 5:36–37, 6:24–25). Petitioners also argue that Dr. Stevick acknowledges that the Board’s construction would encompass compressors. *Id.* (referencing Ex. 2229 ¶¶ 49, 50); *see also* Ex. 2229 ¶ 50 (“[T]he Board’s preliminary interpretation of ‘fan’ . . . would encompass compressors.”).

Patent Owner replies that Miller’s Wankel pump, as with any positive displacement pump, captures a volume of air, compresses that volume, and then expels that volume. Sur-Reply 9. Patent Owner argues that the Wankel pump “is a device that reduces chamber volume through rotation, where the reduction in chamber volume acts on the air.” *Id.*

We do not find that Patent Owner’s arguments and evidence undermine the Petition’s showing that pump 38 creates a flow of air. As is clear from Miller, pump 38 operates to move air in and out of air cell module 14 to inflate and deflate the cell. *See* Ex. 1213, 4:27–30. The inflation and deflation is caused by rotor 42 acting on the air to create a flow of air into and out of the cell. *See id.* at 3:62–4:6. Patent Owner fails to explain adequately why the flow of air must be continuous between all affected regions. Also, regardless of whether Wankel pumps are referred to as fans, the pump falls within the construction of the term “fan” as the patentee uses the term in the ’394 patent Specification. Finally, although we agree with Patent Owner that, like all positive displacement pumps, a Wankel pump is a device that reduces chamber volume through rotation,

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where the reduction in chamber volume acts on the air, that reduction in chamber volume results in an increase in the gas pressure. *See, e.g.*, Ex. 2247, 9 (“Displacement pumps are essentially divided into reciprocating and rotary types, depending on the nature of movement of the *pressure-producing members*.”)(emphasis added).

For the reasons above, we find that the information in the Petition demonstrates, by a preponderance of the evidence, that Miller discloses a fan and motor assembly for pumping air.

Alternatively, Petitioners contend that Miller discloses a rotary vane pump. *See* Pet. 35 (identifying vane pump 138). Petitioners contend that a person having ordinary skill in the art would have had reason to substitute vane pump 138 for Wankel pump 38. *Id.* at 36. Specifically, Petitioners contend that a person having ordinary skill in the art (1) “would have generally recognized rotary vane pumps like rotary vane pump 138 as being relatively ‘smaller and lighter,’ which ‘permits the overall [pump] to be of smaller size and weight for ease of transportability and installation’” (referencing Ex. 1232, 1:61–65); and (2) “would have understood the replacement to be nothing more than a simple substitution of one known element (a [Wankel] pump 38) for another known element (a rotary vane pump 138) to obtain a predictable result (a pump assembly for pumping air)” as these pumps are “readily interchangeable” (referencing Ex. 1202 ¶ 187). Pet. 36.

Patent Owner argues that a person having ordinary skill in the art would not have substituted Miller’s rotary vane pump for Miller’s Wankel pump. PO Resp. 47. Patent Owner argues that Miller’s Figure 6 shows

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rotary vane pump 138 outside air cell 114. *Id.* at 48. Patent Owner continues that a person having ordinary skill in the art would have understood that the Wankel pump of the first embodiment (pump 38) has a flatter shape than a round, rotary vane pump. *Id.* at 48–49. Patent Owner argues that this shape difference is why Miller locates the rotary vane pump outside of the air cell, so as to avoid discomfort when sitting in Miller’s seat. *Id.* at 49.

Petitioners respond that Miller discloses that its rotary vane pump 138 would be contained in a cutout in seat back 12, which could be deepened to accommodate the larger profile of the rotary pump. Reply 17. Patent Owner’s reply reiterates the differences between the flat-sided pump 38 and round pump 138. Sur-Reply 10–11.

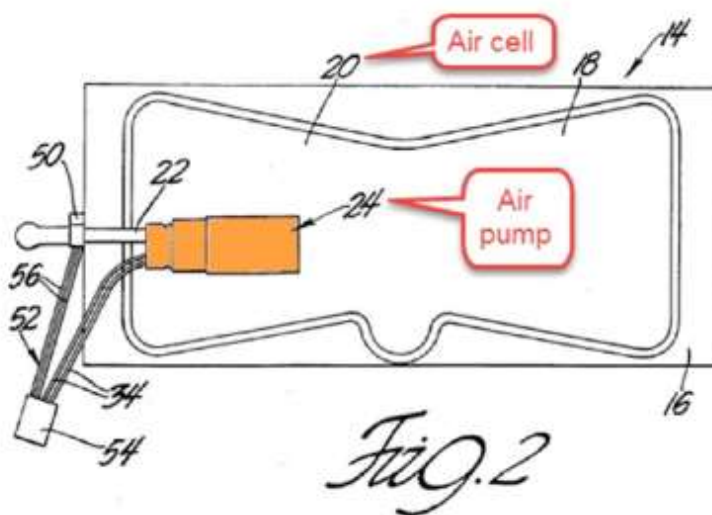
We determine that Petitioners have not demonstrated, by a preponderance of the evidence, why a person having ordinary skill in the art would have had reason to substitute rotary vane pump 138 for Wankel pump 38 and locate rotary vane pump 138 inside of air cell 14. *See, e.g., Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.”). We agree with Petitioners that Miller suggests substituting rotary vane pump 138 for Wankel pump 38, but Miller expressly discloses that, with this substitution, rotary vane pump 138 would be located *outside* of the air cell. *See* Ex. 1213, Fig. 6. In weighing the complete record, we determine that Petitioners have not provided sufficient evidence and arguments to outweigh the express teaching of Miller to have

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rotary vane pump 138 outside of the air cell, especially in light of the additional fact that Miller clearly discloses a preference for pump 38 to be located *inside* the air cell. Accordingly, we do not further analyze Petitioners' obviousness positions directed to substituting rotary vane pump 138 for Wankel pump 38.

Independent claim 1 further recites "a housing built into the inflatable body, the housing having an interior region." Ex. 1201, 8:27–28.

Petitioners contend that Miller's air pump assembly 24 (including Wankel pump 38) is contained in housing 26. Pet. 37 (referencing Ex. 1202 ¶¶ 190–194). Petitioners add that housing 26 includes an interior region. *Id.* at 38. Petitioners further contend that Miller discloses that air pump assembly 24, including housing 26, is built into air cell 20. *Id.* at 38. Petitioners explain that air pump assembly 24 is disposed inside of air cell 20 and welded into place. *Id.* at 38–39. We reproduce Petitioners' annotated version of Miller's Figure 2, below.



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This annotated version of Miller's Figure 2 identifies air cell 20 and air pump assembly 24 (in orange), with air pump assembly 24 located inside air cell 20. *See* Pet. 39; *see also* Ex. 1213, 3:31–33 (“The air cell module 14 further comprises an electric motor driven air pump subassembly 24 that is disposed inside the air cell 20 and welded in place.”).

Patent Owner responds that pump 38 “is separate from the walls of the air cell” because it is “entirely internal . . . and never built into the inflatable body structure as required by all ‘394 patent claims.” PO Resp. 44.

Petitioners reply that air pump 24 is welded in place inside the air cell, either to backing member 16 or plastic member 18. Reply 2. Petitioners add that Patent Owner has no evidence to support this contention. *Id.* Patent Owner replies that, the fact that Miller's pump must be welded in place illustrates that the pump is not integrated into the inflatable body. Sur-Reply 1.

We determine, based on the complete record, that the information in the Petition demonstrates, by a preponderance of the evidence, that Miller discloses a housing built into the inflatable body, the housing having an interior region. *See* Pet. 37–39. We find that pump 38 includes a housing with an interior region. *See* Ex. 1213, Fig. 3 (depicting pump 38 and motor 36 enclosed in housing 26, with an interior region adjacent to rotor 42), 3:31–61 (describing the configuration of air pump subassembly 24, including housing 26 made of cup-shaped pieces 28 and 30, with air pump 38 (with a bi-lobular chamber) and electric motor 30 slid into housing piece 30); *see also* Pet. 38 (describing an annotated version of Figure 3).

Also, we find that air pump subassembly 24 is built into Miller's inflatable body; that is, the air pump subassembly is integrated into and not

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detachable from air cell 20. As the Petition describes, Miller discloses that air pump subassembly 24 is welded to the interior wall of air cell 20, thus it is not detachable from the wall. Pet. 38–39; *see* Ex. 1213, 3:31–43; *see also* Ex. 1202 ¶¶ 192, 193; Ex. 1625 ¶¶ 16–20. Also, we find that, because air pump subassembly 24 is disposed *entirely within* air cell 20, the housing is *integrated into* the inflatable body. By being fixed *inside* air cell 20, air pump subassembly 24 is part of the air cell, i.e., integrated into the air cell.

Patent Owner’s argument does not undermine the Petition’s showing. Patent Owner seems to argue, in its Patent Owner Response, that this limitation requires the housing to be built into *the wall* of the inflatable body. The claim, however, does not require the housing to be built into *the wall* of the inflatable body; it, instead, requires the housing to be built into the inflatable body itself. *See* Ex. 1201, 8:27. Patent Owner also seems to argue that the air pump cannot be integrated into the air cell if it must be welded into the air cell. Again, this argument does not undermine Petitioners’ position. We find that being entirely within air cell 20 makes air pump assembly 24 integrated *into* the inflatable body.

Independent claim 1 also recites:

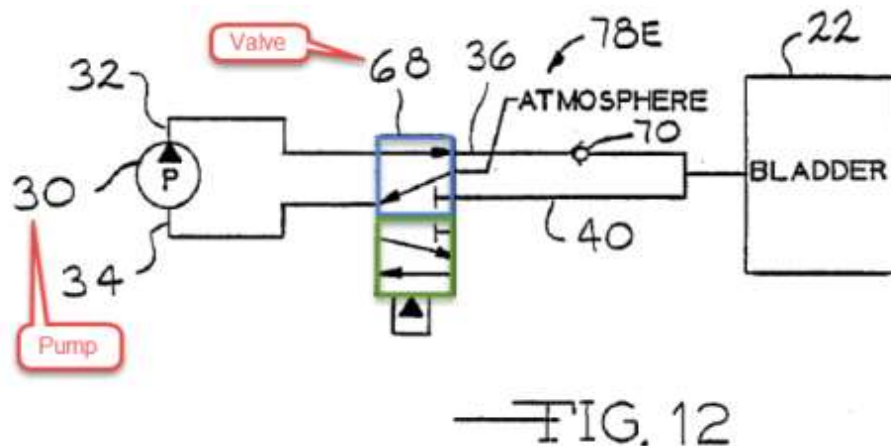
an air conduit disposed at least in part in the housing, the air conduit being movable between a first position and a second position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position.

Ex. 1201, 8:29–35 (the “air conduit” limitation). Petitioners recognize that Miller, which discloses that pump 38 is a reversible pump, does not disclose the recited air conduit. Pet. 39–40. Petitioners contend that Scott discloses a

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uni-directional pump with the recited air conduit configured as recited in the “air conduit” limitation. *Id.* at 40 (identifying the conduit in Scott’s valve 68).

Petitioners explain that Scott’s Figure 12 presents uni-directional pump 30 with valve 68 used to inflate and deflate bladder 22. Pet. 40–41. Petitioners explain that valve 68 includes four ports: (1) atmosphere, (2) pump inlet 34, (3) pump outlet 32, and (4) bladder 22 (through air conduit 36 or 40). *Id.* at 41–42. We reproduce Petitioners’ annotated version of Scott’s Figure 12, below.



This annotated figure identifies pump 30 and valve 68 and highlights the two positions for valve 68, one in blue and one in green. Pet. 41. Petitioners contend that “[i]n the first position (outlined in blue, above), valve 68 connects **port 1** (atmosphere) with **port 2** (pump inlet 34), and **port 3** (pump outlet 32) with **port 4** (bladder 22). *Id.* at 42 (referencing Ex. 1213, 5:50–53). “In its second position (outlined in green), valve 68 connects **port 4** (bladder 22) with **port 2** (pump inlet 34), and **port 3** (pump outlet 32) with **port 1** (atmosphere). *Id.* (referencing Ex. 1212, 5:62–66;

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Ex. 1202 ¶ 115); *see also* Ex. 1271 (providing an animation showing how valve 68 allows pump 30 to inflate and deflate bladder 22); Pet. 44–49 (explaining how Miller’s pump, in combination with Scott’s teaching of a uni-directional pump including a valve such as valve 68 performs as recited in the “air conduit” limitation).

Petitioners contend that, in converting Miller from a reversible pump to a uni-directional pump with valve 68, a person having ordinary skill in the art would have maintained Miller’s pump housing, “such that the movable air conduit (i.e., such as Scott’s valve 68) was disposed inside Miller’s housing 26.” Pet. 44–45 (referencing Ex. 1202 ¶¶ 197, 205–207). We address Petitioners’ reasoning for positioning valve 68 within the housing and their other reasons in support of this modification, below.

Patent Owner responds that “[n]either Miller nor Scott nor the combination of Miller with Scott teaches an air conduit disposed at least in part in the housing” as required by claim 1. PO Resp. 35. Patent Owner explains that, in Miller’s first embodiment, solenoid valve 50, which controls the flow of air to and from air cell 20, is disposed outside of housing 26. *Id.* at 35–36; *see also* Ex. 1213, 4:13–20 (describing how solenoid valve 50 operates). Patent Owner continues that “Scott does not teach anything about the arrangement of the ‘valve 68,’ which Petitioners allege is the claimed air conduit, relative to a housing.” PO Resp. 36. Patent Owner argues that, because Miller positions the pump components within a housing, but positions the air valve outside of that housing, a person having ordinary skill in the art, if motivated to make Petitioners’ modification, would have positioned Smith’s valve 68 outside of housing 26. *Id.* Patent

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Owner concludes that, with valve 68 outside of housing 26, Petitioners' modified arrangement does not result in "an air conduit disposed at least in part in the housing." *Id.* That is, Patent Owner argues that the combined teachings of Miller and Scott do not result in the air conduit positioned at least in part in the housing because neither reference discloses that location for a valve.

Petitioners reply that Patent Owner's position ignores the four alternative reasons why a person having ordinary skill in the art would have retained Miller's housing design. Reply 9. Petitioners also argue that, even if Miller was read to prefer positioning the air valve outside of the housing, this preference would not teach away from the proposed modification. *Id.* at 10. Petitioners continue that Miller teaches that its housing 26 has sufficient space to accommodate additional components such as valve 68 and, with a smaller, uni-directional pump, the housing would have even more space. *Id.* Patent Owner replies that it addresses Petitioners' reasoning in its Patent Owner Response. Sur-Reply 2. Patent Owner stresses that its position is that neither Miller nor Scott, alone or in combination, teaches an air conduit position at least in part in the housing. *Id.* at 5.

For the reasons above, we determine that Petitioners' *proposed modification* of Miller with Scott's uni-directional pump includes placing Scott's valve 68 within Miller's housing such that the proposed modified version of Miller's system includes an air conduit positioned at least in part in the housing, where the air conduit operates as claimed in the "air conduit" limitation. *See* Pet. 44–45 (A person having ordinary skill in the art "would

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have maintained Miller’s housing-contained design . . . such that . . . Scott’s valve 68[] was disposed inside Miller’s housing 26.”). That is, Petitioners argue that it would have been obvious, in view of its proposed modification, to locate a directional valve, such as valve 68, in the housing for the pump. We address Petitioners’ reasoning for this modification in the subsection below.

Independent claim 1 finally recites “wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.” Ex. 1201, 8:36–38. Petitioners contend that, based on their proposed modification of Miller to include Scott’s valve 68 within Miller’s housing 26, air would flow between the interior region of the housing and the inflatable body during inflation and deflation as required by this claim element. Pet. 49 (referencing Ex. 1212, Fig. 12; Ex. 1202 ¶¶ 220–224).

We determine, based on the complete record, that the information in the Petition demonstrates, by a preponderance of the evidence, that Miller’s housing, as modified by Scott’s valve as proposed by Petitioners, discloses the subject matter of this claim limitation. *See* Pet. 49; Ex. 1212, Fig. 12; Ex. 1202 ¶¶ 220–224. Patent Owner does not dispute Petitioners’ contentions with respect to this limitation, other than as discussed above with respect to the air conduit limitation.

ii. Reasons to combine Miller and Scott

Petitioners contend that a person having ordinary skill in the art would have had reason to modify Miller with Scott’s teaching of a uni-directional pump employing a valve, such as valve 68. Pet. 42.

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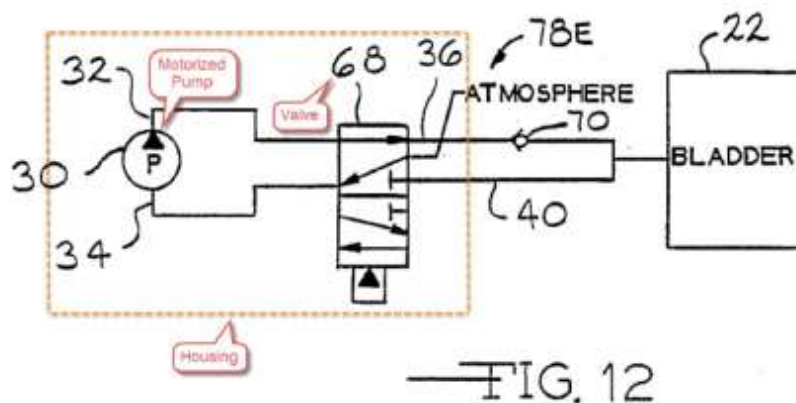
First, Petitioners contend that its proposed modification would increase the spatial efficiency of air pump 24. Pet. 42. Petitioners rely, in part, on Scott’s express disclosure that reversible pumps are less efficient and, as such, a larger motor is needed to create the same air pressure as a uni-directional pump. *Id.* (citing Ex. 1212, 1:42–45). Petitioners explain that their proposed modification would allow Miller’s motor 36 to be smaller and that a person having ordinary skill in the art would have appreciated that this benefit is significant to Miller, given the small size of air cell 20. *Id.* at 42–43 (referencing Ex. 1202 ¶ 199).

Second, Petitioners reason that their proposed modification would have resulted in energy efficiencies and that a person having ordinary skill in the art would have desired a more efficient pump. *Id.* at 43 (referencing Ex. 1206, 4:29–32; Ex. 1202 ¶ 200). Again relying on Scott’s disclosure, Petitioners contend that “the pump efficiency of a one-directional pump is greater than the efficiency of a reversible pump.” *Id.* (quoting Ex. 1212, 1:54–56).

Third, Petitioners reason that their proposed modification would have decreased cost, as Scott expressly teaches that reversible pumps are more expensive than uni-directional pumps. Pet. 43 (referencing Ex. 1212, 1:40–43, 1:49–54; Ex. 1202 ¶ 201).

Fourth, Petitioners reason that a more efficient pump would have decreased the weight of pump 24, as it would require a smaller motor, again relying on Scott’s express teachings. *Id.* at 43–44 (referencing Ex. 1212, 1:42–45; Ex. 1202 ¶ 202).

Next, Petitioners explain why a person having ordinary skill in the art would have maintained Miller’s pump housing. Pet. 44–45. Petitioners’ reasons include compactness (referencing Ex. 1202 ¶ 209; Ex. 1232, Abstract); durability (referencing Ex. 1202 ¶ 209; Ex. 1206, 4:20); and decreased manufacturing costs (referencing Ex. 1202 ¶ 211). *Id.* at 45. Petitioners continue that maintaining a housing would have been well known to a person having ordinary skill in the art and maintaining the design would have yielded predictable results, even with a uni-directional pump. *Id.* (referencing Ex. 1202 ¶ 212; Exs. 1210, 1230, 1231, 1237, 1245). To illustrate their proposed modification, Petitioners annotate Scott’s Figure 12, which we reproduce below.



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Pet. 45. This annotated figure depicts uni-directional pump 30 and valve 68 within a housing, as Petitioners propose.

Patent Owner responds that the teachings in Scott directed to how a uni-directional pump is more efficient than a reversible pump (“Scott’s efficiency statement,” Ex. 1212, 1:41–45) does not apply to Miller’s Wankel pump 38. PO Resp. 36–37. Patent Owner argues that “Petitioners have not explained how Scott would apply to reversible displacement pumps that are equally efficient in both directions, such as Miller’s Wankel pump.” *Id.* at 37. Patent Owner explains that Miller’s Wankel pump, by its nature, is equally efficient in either operating direction because the operation of a positive displacement pump is “inherently symmetric.” *Id.* at 38. Patent Owner adds that a person having ordinary skill in the art would have understood that Scott’s efficiency statement did not apply to Miller’s pump. *Id.* at 39 (referencing Ex. 2229 ¶¶ 99–120).

Petitioners reply that Patent Owner’s argument misunderstands Petitioners’ position. Reply 3. Petitioners explain that a person having ordinary skill in the art would have understood, consistent with Scott’s teachings, that, to increase the efficiency of Miller’s pump, the pump would have been modified for a single direction of rotation. *Id.* (referencing Ex. 1625 ¶ 25). Petitioners continue that their position is consistent with Patent Owner’s expert testimony that Scott’s efficiency statement applies to pumps of the same type. *Id.* (referencing Ex. 1646 ¶ 98; Ex. 1644 ¶¶ 92, 105; Ex. 1625 ¶ 25). Petitioners add that Dr. Stevick’s testimony supports their contentions. *Id.* at 4 (referencing Ex. 2229 ¶ 108; *id.* ¶ 104; Ex. 1625 ¶ 26; Ex. 1601, 63:5–21, 64:13–65:2; Ex. 1646 ¶ 156; Ex. 1645, 61–62).

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Patent Owner replies that Dr. Beaman's testimony does not include the requisite facts and data to support Petitioners' position. Sur-Reply 2–3. Patent Owner argues that if we discount Dr. Beaman's testimony, the Petitioners have no evidence to support its assertions with respect to Scott's efficiency statement. *Id.* at 3.

Patent Owner also responds that Scott's statements with respect to efficiency and cost are directed to comparing one pump against another pump, not comparing pump assemblies. PO Resp. 39–40. Patent Owner argues that Petitioners do not offer sufficient evidence and arguments that a uni-directional pump, in conjunction with valve 68, would have the size, cost, energy efficiency, and weight advantages argued by Petitioners. *Id.* at 40. Patent Owner adds Petitioners provide no evidence that adding a non-manual method for operating valve 68 would not adversely affect the argued advantages. *Id.* at 41. For example, Patent Owner argues that Petitioners fail to show that, once you incorporate a non-manual means to operate valve 68, the system would still be more energy efficient than Miller's system. *Id.* Patent Owner at least suggests that any efficiencies in employing a uni-directional pump and valve 68 may be lost due to resistance at valve 68. *Id.* (referencing Ex. 2229 ¶¶ 91–98).

Similarly, Patent Owner argues that there would be no net size reduction based on Petitioners' proposed modification because the modification results in adding components to the housing. PO Resp. 43–44.

Petitioners reply that Scott's efficiency statement is directed to its "invention," which includes valve 68. Reply 5 (referencing Ex. 1625 ¶¶ 28–29). That is, the efficiency statements take into consideration a uni-

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directional pump assembly and compare that assembly with a reversible pump. *Id.* (referencing Ex. 1625 ¶ 30). Petitioners add that Patent Owner’s declarant agrees with Petitioners’ position. *Id.* (referencing Ex. 1635, 521:9–14, 521:20–522:3, 522:9–15; Ex. 1601, 63:5–21, 64:13–65:2). Petitioners argue that Scott’s efficiency statement would “make[] little sense” if it ignored the structure that allowed the uni-directional pump to both inflate and deflate. *Id.* at 6. Petitioners add that, even if Patent Owner’s argument was correct, the pump motor is a significant component of the assembly and savings associated with the motor “would result in significant savings for the entire pump design.” *Id.* at 6–7. Finally, Petitioners reply that Miller discloses that its housing would have plenty of room for additional components, such as a non-manual method for operating valve 68. *Id.* at 7.

Patent Owner replies that Scott’s efficiency statement is expressly directed to pump efficiency, not pump assembly efficiency. Sur-Reply 4–5. Patent Owner also argues that Petitioners did not quantify the additional costs associated with the additional components needed to implement Scott’s uni-directional pump. *Id.* at 5.

Patent Owner also responds that Miller’s configuration does not benefit from any energy or size savings. PO Resp. 45. Patent Owner argues that because “a car’s alternator provides effectively unlimited electricity,” Miller would not benefit from a system that requires less electricity. *Id.* Also, given the fixed size of Miller’s seat, Miller would not benefit from a size reduction. *Id.* Finally, Patent Owner argues that the additional

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components, such as a non-manual control system for valve 68, would offset any cost advantages. *Id.* at 45–46.

Petitioners reply that Scott is directed to an automotive application, so a person having ordinary skill in the art would have understood that Miller would benefit from the efficiencies disclosed in Scott. Reply 9 (referencing Ex. 1625 ¶ 42). Petitioners add that Miller references the advantages of a compact, space-efficient design. *Id.* (referencing Ex. 1625 ¶¶ 43–44, which relies on, for example, Ex. 1213, 2:14, 2:44–45, 2:50–52). Petitioners conclude that Patent Owner’s declarant also recognizes that an objective of Miller is to provide a compact design. *Id.* (referencing Ex. 2229 ¶ 116). In its Sur-Reply, Patent Owner reiterates its positions. Sur-Reply 6–7.

Patent Owner also responds that Petitioners do not explain how its system would work without check valve 70, which was not identified by Petitioners in the Petition. PO Resp. 41–42, 46. Patent Owner argues that because the proposed modified system would leak air, the modification does not represent a simple substitution that would yield predictable results. *Id.* at 47.

Petitioners reply that a person having ordinary skill in the art would have known how to prevent the system from leaking. Reply 8 (referencing Ex. 1625 ¶ 40).

Finally, as we discussed above, in connection with our analysis of the air conduit limitation of claim 1, Patent Owner argues, essentially, that the information in the Petition fails to provide a reason why a person having ordinary skill in the art would have located valve 68 in housing 24, as neither reference discloses this arrangement. *See* PO Resp. 35–36.

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We find, based on the complete record, that the Petition sufficiently articulates a reason, with rational underpinnings, for substituting Miller’s reversible pump with Scott’s uni-directional pump and valve 68. *See KSR Int’l Co.*, 550 U.S. at 418 (“[O]bviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006))).

With respect to Petitioners’ reasoning that their proposed modification constitutes a simple substitution of known elements to achieve a predictable result, we give little or no weight to this reasoning. Petitioners fail to explain adequately why this substitution is “simple.” *See* Pet. 44 (referencing Ex. 1242, 11:59–63; Ex. 1202 ¶ 203); Reply 7 (referencing Ex. 1625 ¶ 34; Ex. 1242, 11:59–63). Dr. Beaman’s testimony is entitled to little or no weight, as it relies on Guthrie (Ex. 1242) without further explanation, other than Guthrie demonstrating the “interchangeability” of reversible and uni-directional pumps. *See* Ex. 1202 ¶ 203; Ex. 1625 ¶ 34. The cited section of Guthrie (11:59–63) merely states that a reversible blower may be used in place of Guthrie’s cardiopulmonary resuscitation (CPR) valve. *See* Ex. 1242, 11:59–63. Without further explanation or evidence, we find that this single reference does not support the “interchangeability” of reversible and uni-directional pumps such that the interchange would constitute a simple substitution. *See, e.g.*, PO Resp. 40, 41, 46 (discussing some of the additional considerations associated with substituting Scott’s uni-directional pump for Miller’s reversible pump, such that the substitution is not “simple”).

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With respect to Petitioners' reasoning that the proposed modification would result in spatial efficiency, we give this reasoning little or no weight. In rebutting certain of Patent Owner's arguments, Petitioners contend that Miller's housing 26 has "plenty of room" to contain additional components, such as valve 68 and a non-manual method for operating valve 68. *See* Reply 6–7, 9–10. Petitioners fail to explain adequately how maintaining housing 26, with its "plenty of room," would result in spatial efficiency. That is, housing 26 would occupy the same space before and after the proposed modification if that housing is maintained.

We do give some weight to Petitioners' reasoning as to energy efficiency, cost, and weight. We agree with Petitioners that Scott expressly teaches that its system, including its valve structure, would be cheaper and more efficient. *See* Pet. 43–44, Reply 5–6. Scott expressly states that "[i]t is an advantage of the present invention that *the air delivery system* cost is reduced by use of a single, one directional pump versus two pumps or a reversible pump" and also states "that the pump efficiency of a one-directional pump is greater than the efficiency of a reversible pump." Ex. 1212, 1:50–56 (emphasis added). We find that these statements, in light of the fact that Scott and Miller are directed to very similar technologies, would have motivated a person having ordinary skill in the art to modify Miller with Scott's pump assembly. *See, e.g.*, Ex. 1212, 10–15 (indicating that the invention relates to a vehicle seat with an inflatable bladder that provides support for an occupant); Ex. 1213, 1:7–9 (indicating that the invention relates to adjustable air cells for seat comfort).

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We do not credit Dr. Beaman’s testimony, however, as we find that it does not support Petitioners’ positions beyond what is disclosed in Scott. Dr. Beaman’s reliance on other references either misinterprets or misapplies the references. *See* Ex. 1202 ¶ 189 (relying on Exs. 1210, 1205, 1212, 1263, and 1272 for the proposition that “a Uni-directional Pump Assembly could produce the same amount of volume flow with a smaller, single direction motor by optimizing the vanes of Miller’s rotary vane pump 138, for example, for the single direction of rotation,” where the references merely use a uni-directional pump for applications different than Miller and with no teaching of optimizing a positive displacement pump), ¶ 199 n.38 (citing to Exs. 1231, 1232, 1206, 1212, 1213, 1240,¹⁵ and 1229 without further explanation), ¶ 200 (relying on Ex. 1206 for the proposition that a person having ordinary skill in the art would have desired a more efficient pump, where the reference was discussing its pump used for its specific application, including being battery operated), ¶ 203 (relying on Guthrie without further explanation).

With respect to Patent Owner’s argument that Petitioners have no evidence to support its assertions with respect to Scott’s efficiency statement without Dr. Beaman’s testimony, we do not agree. *See* Sur-Reply 3. Scott

¹⁵ Dr. Beaman testifies, with respect to Ex. 1240, that it “not[es] that ‘the interior of the pump can be maintained as simply as possible’ because ‘reversal of the direction of rotation of the electric motor driving the pump is also not necessary.’” Ex. 1202 ¶ 89. The reference actually discloses that “the interior of the pump can be maintained as simply as possible” because the reversing mechanism is located *outside* of the housing, not because of employing a uni-directional pump. Ex. 1240, 15.

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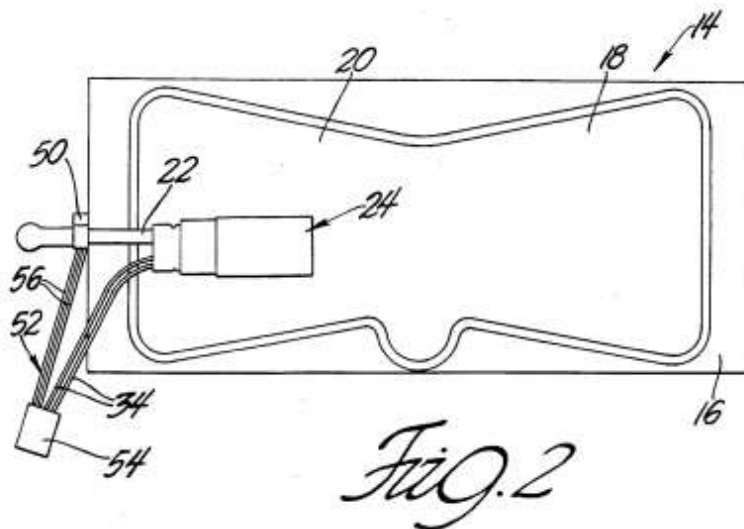
itself constitutes evidence in the record, and at least suggests to one of ordinary skill in the art (especially in the narrower field of automotive seat inflatable products) that substituting a uni-directional pump for a reversible pump would realize cost and efficiency advantages. *See Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1365 (Fed. Cir. 2008) (“The [teaching-suggestion-motivation] test, *flexibly applied*, . . . assures that the obviousness test proceeds on the basis of evidence—teachings, *suggestions* (a tellingly broad term), or motivations (an equally broad term)—that arise before the time of invention as the statute requires.” (emphasis added)).

In summary, we find that Petitioners provide reasons, with rational underpinnings, for substituting Miller’s bi-directional pump with a uni-directional pump and its associated valve and control system. This finding does not address all of the disputes between the parties, however. We turn next to Petitioners’ reasoning for placing a directional valve, as taught by Scott’s valve 68, into Miller’s housing.

We find that Petitioners do not provide persuasive reasons, with rational underpinnings, for locating Scott’s valve 68 in Miller’s housing 26. *See* Pet. 44–46. As background, Miller defines a system with an air valve located outside of air cell 20. *See* Ex. 1213, Fig. 2 (showing solenoid valve 50). As Miller explains, “solenoid valve 50 is disposed outside the air cell 20 and connected to the exterior end of the air tube 22 to control the flow of air to and from the air cell 20.” *Id.* at 4:14–17. Miller also discloses that electrical connections to solenoid valve 50 and the pump allow for remote

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operation of the valve and pump. *Id.* at 4:17–24. We reproduce Miller’s Figure 2, below.



Miller’s Figure 2 depicts “a front view of” air cell module 14. *Id.* at 2:64. This depiction shows solenoid air valve 50 outside of air cell 20 and connected to electrical connector 54 through pigtail 52 with electrical leads 56. *See id.* at 4:13–20.

The Petition states that “in converting Miller’s Reversible Pump Assembly in view of Scott, a [person having ordinary skill in the art] would have maintained Miller’s housing-contained design . . . , *such that* the movable air conduit (i.e., such as *Scott’s valve 68*) *was disposed inside Miller’s housing 26.*” Pet. 44–45 (emphasis added). The Petition continues that a person having ordinary skill in the art would have had “several reasons” to maintain the housing—compactness, durability, and decreased manufacturing costs. *Id.* at 45 (referencing Ex. 1202 ¶¶ 209–211; Ex. 1206, 4:20; Ex. 1232, Abstract). The Petition adds that maintaining the housing “would have been a well-known option . . . that would have yielded

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predictable results.” *Id.* (referencing Ex. 1202 ¶ 212, which cites to Exs. 1210, 1230, 1231, 1237, 1245).

Dr. Beaman testifies that “dispos[ing] the valve, like Scott’s valve 68, inside of Miller’s housing 26 . . . would have promoted the *spatial efficiency* of Miller’s converted Uni-directional Pump Assembly.” Ex. 1202 ¶ 209. Dr. Beaman explains that “disposing the valve inside of Miller’s housing 26 would have provided for a more compact, unitized design, as compared to, for example, a Miller Uni-directional Pump Assembly with a directional control valve located outside of the housing.” *Id.*

Dr. Beaman also testifies that “dispos[ing] the valve, like Scott’s valve 68, inside of Miller’s housing 26 . . . would have promoted the *durability* of Miller’s converted Uni-directional Pump Assembly.” Ex. 1202 ¶ 210. Dr. Beaman explains that a person having ordinary skill in the art “would have appreciated that a housing served ‘to *protect* the inner workings of the pump’ . . . [t]hus disposed inside of Miller’s housing 26, the directional control valve would have been better protected from damage or other harm.” *Id.* (quoting Ex. 1206, 4:20).

Dr. Beaman also testifies that a person having ordinary skill in the art “would have recognized that containing the valve, like Scott’s valve 68, in Miller’s housing 26 would have decreased manufacturing *costs*.” Ex. 1202 ¶ 211. Dr. Beaman explains that “the air pump assembly components of Miller’s converted Unidirectional Pump Assembly (such as, Scott’s valve 68) would be unitized in Miller’s housing 26,” which “would have simplified handling of Miller’s converted Uni-directional Pump Assembly air pump 24 during manufacturing and further simplified interfacing the air

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pump 24 with the air cell 20 during manufacturing, both of which would have resulted in reduced manufacturing and logistics costs.” *Id.*

Patent Owner responds that Petitioners have not presented evidence that the combination of a uni-directional pump, a directional valve, such as valve 68, and any components necessary to control the valve would result in a size, cost, or weight reduction. PO Resp. 40–41, 43–44.

Petitioners reply that because the valve would be located inside the air cell, certain structures shown in Scott would not be needed. Reply 7. Petitioners also argue Miller discloses that its housing has “plenty of room.” *Id.* (referencing Ex. 1213, 4:9–12); *see also* Reply 18 (indicating that “no ‘additional space’ would be necessary” to house the components necessary to operate valve 68). Petitioners also argue that Patent Owner fails to consider the cost and space savings that would result from the combination of Miller and Scott, which would be significantly more than any additional costs for controlling the valve. *Id.* at 18–19.

Patent Owner replies that Miller’s disclosure about having “plenty of room” in housing 28 is directed to electrical leads and other electrical components, such as capacitors. Sur-Reply 13. Patent Owner argues that the valve required to support the unidirectional pump is larger than a capacitor.¹⁶ *Id.*

¹⁶ In support of this contention, Patent Owner cites to “Beaman Depo., 231:12–232:6” without citing to an exhibit number. *See* Sur-Reply 13. This reference is apparently to Exhibit 2753, one of three Beaman depositions in this record.

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As to spatial efficiency, we find that this reasoning is not supported by a rational underpinning. First, we agree with Patent Owner that Miller’s disclosure of “plenty of room” is in the context of small electrical components. *See* Ex. 1213, 4:9–12 (“The housing piece 28 also has plenty of room for the electric leads 34 as well as other electrical components such as capacitors that may be needed or desired.”). Petitioners have not provided persuasive evidence that, even with a smaller motor, Petitioners’ proposed modification that includes a directional valve and its control components, would allow for any space savings.

Second, although eliminating valve 50 and including a directional valve in housing 28 may reduce the space taken by valve 50 in the entire system, Petitioners do not provide persuasive evidence of the advantage of this change. Valve 50 is located outside of air cell module 14 and in the same plane as cell module 14 (which includes housing 26) over an area of the back of an automobile seat. *See id.*, Figs 1, 2. Miller is concerned with spatial efficiency as it relates to the *depth* of its structures, such as pump 24 in housing 26. *See id.* at 3:42–45 (“[H]ousing 26 is preferably of oval cross section as shown in F[igures] 4 and 5 to reduce the width of the housing 26 and provide flat sides to avoid discomfort to a seat occupant as explained below.”); *id.*, Fig. 1 (showing the flat side of pump 24 parallel to the seatback). Petitioners do not adequately explain any benefit of moving a structure that is on the same plane as housing 26, given the size of the overall area of the seatback and the lack of evidence that the areal arrangement of components is at a premium. *Cf.* PO Resp. 45 (“[T]he car

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seat itself is not getting any smaller, so Miller does not need the space advantages of Scott's unidirectional pump.'").

With respect to manufacturing cost savings, we give Dr. Beaman's supporting testimony some, but not considerable, weight, as Dr. Beaman does not provide any underlying data or analysis in support of his opinion. Dr. Beaman does provide the basis underlying his opinion—that unitizing Miller's housing would simplify manufacturing (making it cheaper) as the single structure would simplify interfacing with air cell 20. Ex. 1202 ¶ 211. Dr. Beaman, however, does not provide any evidence to support his basis, instead relying on the inference that this simplification would provide an overall manufacturing cost savings. *Cf.* PO Resp. 40–41 (identifying factors that could adversely impact cost).

As to durability, we credit this reasoning to a small extent. Given that one function of a component housing is to protect the component (*see* Ex. 1206, 4:20), we credit Dr. Beaman's testimony with respect to added durability. *See* Ex. 1202 ¶ 210. This reasoning, however, is directed more to components in housings in the abstract, rather than directed specifically to Miller's system. For example, Petitioners do not direct us to persuasive evidence that, if located where valve 50 is located, a directional valve, such as Scott's valve 68, would be less durable than if positioned in a housing. Valve 50 is located inside a seatback, which would provide its own protection of the components. *See* Ex. 1213, Figs. 1, 2. That is, we do not discern any persuasive evidence that the durability of an air valve inside housing 26 would be significantly increased over one located outside the air cell but still within the seatback.

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“[O]bviousness must be determined in light of *all the facts*, and . . . a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (emphasis added); *see also PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1196 (Fed. Cir. 2014) (“The presence or absence of a motivation to combine references in an obviousness determination is a pure question of fact.”). We recognize that, “[e]ven under [the] ‘expansive and flexible’ obviousness analysis [of *KSR*], we must guard against ‘hindsight bias’ and ‘*ex post* reasoning.’” *St. Jude Med., Inc. v. Access Closure, Inc.*, 729 F.3d 1369, 1381 (Fed. Cir. 2013) (citation omitted).

In considering both parties’ arguments and weighing the supporting evidence, we find that Petitioners have not demonstrated, by a preponderance of the evidence, that a person having ordinary skill in the art would have positioned a directional valve, such as Scott’s valve 68, inside Miller’s housing in view of Miller positioning its valve outside of its air cell. In making this finding, we do not find that Miller, by disclosing its valve 50 outside of air cell 20, teaches away from other valve locations, including in the housing. Instead, in making our finding, we give weight to Miller locating valve 50 outside of air cell 20 as a preferred location. *Cf. Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1069 (Fed. Cir. 2018) (“But even if a reference is not found to teach away, its statements regarding preferences are relevant to a finding regarding whether a skilled artisan would be motivated to combine that reference with another reference.”). Petitioners do not provide persuasive arguments or evidence to overcome the

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direct evidence in Miller describing positioning a directional valve where valve 50 is located. Said another way, the information in the Petition does not demonstrate, by a preponderance of the evidence, that it would have been obvious to locate a directional valve, such as valve 68 of Scott, inside housing 26, in light of Miller's express teaching of its air valve outside of cell 20. Instead, the proposed modification appears to be more the product of hindsight than an obvious modification. *See St. Jude Med.*, 729 F.3d at 1381.

iii. Secondary considerations

Secondary considerations, when present, must always be considered as part of an obviousness inquiry. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012); *see* PO Resp. 62–70 (discussing secondary considerations); Reply 22–27 (same); Sur-Reply 18–26 (same). Because we find that the information in the Petition does not demonstrate, by a preponderance of the evidence, that a person having ordinary skill in the art would have made all of Petitioners' proposed modifications to arrive at the invention of claim 1, we need not address secondary considerations here.

iv. Conclusion as to claim 1

We determine, based on the complete record, that the information in the Petition fails to demonstrate, by a preponderance of the evidence, that claim 1 is unpatentable under 35 U.S.C. § 103 over Miller, Scott, and Wu.¹⁷

¹⁷ We understand that Petitioners' first ground of unpatentability relies on Miller, Scott, and Wu. *See* Pet. 23. Petitioners rely on Wu for claims 4–6

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Our determination is based on weighing the underlying factual findings in the obviousness analysis, as we have presented them above.

b. Dependent claims 2–12.

Claims 2–12 depend, directly or indirectly, from claim 1. In asserting that these claims are unpatentable, Petitioners rely on their position that the combination of Miller and Scott renders claim 1 obvious. *See* Pet. 50–70. Because we find that the information in the Petition does not demonstrate, by a preponderance of the evidence, that a person having ordinary skill in the art would have made all of Petitioners’ proposed modifications to arrive at claim 1, we determine, based on the complete record, that the information in the Petition fails to demonstrate, by a preponderance of the evidence, that claims 2–12 are unpatentable under 35 U.S.C. § 103 over Miller, Scott, and Wu.

c. Claim 16–23.

For independent claim 16 and claims 17–23, which depend, directly or indirectly, from claim 16, Petitioners reference their positions with respect to claims 1–12. *See* Pet. 70–71. For the reasons discussed above in connection with our analysis of claims 1–12, we determine, based on the complete record, that the information in the Petition fails to demonstrate, by a preponderance of the evidence, that claims 17–23 are unpatentable under 35 U.S.C. § 103 over Miller, Scott, and Wu.

and 8–11, which depend, directly or indirectly, from claim 1. *See* Pet. 50–70. Petitioners do not direct us to any teaching in Wu that would inform our analysis of claim 1.

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2. Ground 2 – the Challenged Claims are allegedly unpatentable over Miller, Scott, and Pisante

In an alternative ground, Petitioners contend that the Challenged Claims are unpatentable as obvious over Miller, Scott, and Pisante. Pet. 71. The Petition relies on the identical analysis for claim 1 under this ground as it did for Ground 1. *See id.* (“The unpatentability analysis of claims 1–3, 7, and 12 for Ground 1, above, is identical to the analysis of claims 1–3, 7, and 12 for Ground 2.”). Ground 2 differs only in that it applies the teachings of Pisante instead of Wu in the proposed combination for subject matter claimed in some dependent claims. *See id.* at 71–84 (addressing claims 2–12). For claims 16–23, the Petition relies on its analysis of claims 1–12 under this ground. *See* Pet. 86.

For the reasons stated above in connection with our analysis of claim 1 under Ground 1, we determine, based on the complete record, that the information in the Petition fails to demonstrate, by a preponderance of the evidence, that claim 1 is unpatentable under 35 U.S.C. § 103 over Miller, Scott, and Pisante. Also, for these same reasons, we determine that the information in the Petition fails to demonstrate, by a preponderance of the evidence, that claims 2–12 and 16–23 are unpatentable under 35 U.S.C. § 103 over Miller, Scott, and Pisante.

D. Motions to Exclude

1. Petitioners’ motion to exclude evidence

Petitioners filed a motion to exclude certain exhibits that Petitioners contend are not cited in the Patent Owner Response, Sur-Reply, or any expert declaration. Paper 94, 1. Petitioners seek to exclude this evidence

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(the “Uncited Exhibits”) as irrelevant under Federal Rules of Evidence Rules 401 and 402. *Id.* Petitioners also argue that certain paragraphs in Ex. 2229 (Dr. Stevick’s Declaration) and Ex. 2638 (Dr. Becker’s Declaration) (the “Declaration Portions”) should be excluded. *Id.* at 2–6.

a. Uncited Exhibits

With respect to the Uncited Exhibits (Exs. 2030–2035, 2241, 2242, 2243, 2748, 2751, and 2752), Petitioners argue that prior Board decisions provide that exhibits not cited in a patent owner’s papers should be excluded. Paper 94, 1–2.

In opposition, Patent Owner argues that certain of the Uncited Exhibits are exhibits to depositions. Paper 99, 1. Specifically, Patent Owner argues that Exhibits 2030, 2031, 2032, 2033, 2751, and 2752 are exhibits to Dr. Beaman’s deposition testimony (Exhibits 2040 and 2753). *Id.* Patent Owner adds that Petitioners did not properly object to the evidence, as they did not object to the evidence during the depositions. *Id.* at 2.¹⁸

Petitioners reply that, as to the Uncited Exhibits, Patent Owner addresses only a subset of the exhibits covered in Petitioners’ motion. Paper 102, 1 (identifying Exs. 2234, 2235, 2241, 2242, 2243, and 2748 as uncontested by Patent Owner). As to the contested exhibits, Petitioners argue that Patent Owner does not identify where in its papers it relies on Dr. Beaman’s testimony directed to any of the exhibits challenged by the

¹⁸ Patent Owner does indicate that Exhibit 2030 was objected to at the deposition, but on the basis that it was derived from a different proceeding. Paper 99, 2.

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motion. *Id.* at 2. Petitioners argue that, without reliance on these sections, the exhibits should be excluded. *Id.* at 2–3.

Petitioners also argue that Patent Owner’s argument that Petitioners failed to object at the deposition is nonsensical. Paper 102, 3. Petitioners argue that they could not have known at the time of the deposition that Patent Owner would not rely on those exhibits in its later-filed papers. *Id.* at 3–4.

As to Exhibits 2234, 2235, 2241, 2242, 2243, and 2748, which are not contested by Patent Owner, we deny Petitioners’ motion as moot, as we do not rely on them in this Decision. *See* Patent Trial and Appeal Board, Trial Practice Guide Update, 17 (August 2018) (“Trial Practice Guide August Update”), available at <https://go.usa.gov/xU7GP> (“In the Board’s experience, consideration of the objected-to evidence is often unnecessary to resolve the patentability of the challenged claims, and the motion to exclude is moot.”); *see also* Office Patent Trial Practice Guide, August 2018 Update, 83 Fed. Reg. 39,989 (Aug. 13, 2018) (notice).

We also deny Petitioners’ motion as to the other Uncited Exhibits (Exhibits 2030, 2031, 2032, 2033, 2751, and 2752). As Patent Owner explains, these exhibits were used in conducting Dr. Beaman’s depositions (Ex. 2040 and Ex. 2753) and the complete deposition transcripts are in the record. Although we do not rely on these exhibits in our Decision, we do rely on Dr. Beaman’s depositions. We determine that it is proper to maintain Exhibits 2030, 2031, 2032, 2033, 2751, and 2752 in the record, as they are relevant to testimony in the depositions, even if that testimony is not ultimately relied upon by Patent Owner or Petitioners in this proceeding. If

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we followed Petitioners' reasoning, in cases where a deposition or declaration covers multiple, related proceedings, portions of those exhibits would need to be removed to the extent they do not apply to any one proceeding. Similarly, to the extent that a line of questioning in a deposition or testimony in a declaration eventually is not used to support a party's position, that evidence would need to be excluded from the record. Such an approach would make dealing with evidence, particularly evidence entered in multiple proceedings as we have here, cumbersome to the parties to manage. Accordingly, we determine that we will maintain in the record of this proceeding the complete record of Dr. Beaman's depositions, including the associated exhibits.

b. Declaration Portions

With respect to the Declaration Portions, Petitioners argue that this evidence represents arguments that are improperly incorporated by reference by Patent Owner. Paper 94, 2–6.

Patent Owner argues that a motion to exclude evidence is not the proper vehicle to address incorporation by reference. Paper 99, 3. Patent Owner explains that we ruled on a motion to strike directed to the Declaration Portions. *Id.*; *see* Paper 76 (providing an Order denying Petitioners' motion to strike). Patent Owner also argues that Petitioners' motion improperly incorporates arguments from its motion to strike. Paper 99, 4–5. Finally, Patent Owner argues that it did not improperly incorporate arguments from its experts' declarations. *Id.* at 5–9. Petitioners' reply reiterates that the Declaration Portions were improperly incorporated by reference into the Patent Owner Response. Paper 102, 4–5.

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We deny Petitioners’ motion to exclude the Declaration Portions. Motions to exclude evidence are used to exclude evidence that is not admissible. *See* Trial Practice Guide August Update 16–17. Petitioners do not argue that the Declaration Portions represent *inadmissible* evidence. *Id.* Instead, Petitioners argue that the Declaration Portions represent improper *argument*, rather than evidence. *See* Paper 94, 2–6. Petitioners fail to provide any basis under the Federal Rules of Evidence as to why the Declaration Portions are inadmissible. *See id.*; Trial Practice Guide August Update 16 (“A motion to exclude must explain why the evidence is not admissible (e.g., relevance or hearsay)”). Although Petitioners did object to Exhibits 2229 and 2638, these objections were directed to bases under the Federal Rules of Evidence not argued in their motion. *See* Paper 55, 2, 19. As such, Petitioners have not adequately explained why the Declaration Portions are inadmissible.

Petitioners appear to use the motion to exclude to reargue their motion to strike, this time trying to exclude the underlying declaration paragraphs, rather than the sections of the Patent Owner Response that allegedly incorporate by reference these paragraphs. *See id.*; *see also* Paper 76 (providing our decision on Petitioners’ motion to strike portions of the Patent Owner Response). We already addressed their motion to strike and how we would address any arguments improperly incorporated by reference. Paper 76. As an alternative basis for denying the motion, in this Decision, we do not consider any of the alleged arguments in the Declaration Portions, as they are directed to secondary considerations, which we did not reach here.

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2. Patent Owner's motion to exclude evidence

We now turn to Patent Owner's motion to exclude evidence. In this motion, Patent Owner first "objects to Exhibits 1665–1669 on the ground that they contain improper attorney argument in violation of the page/word count limits for replies." Paper 96, 1. Second, Patent Owner contends that Exhibit 1625, Dr. Beaman's declaration supporting the Reply, mischaracterizes certain earlier testimony of Patent Owner's expert and exceeds the proper scope of a reply. *Id.* at 3. Third, Patent Owner objects, provisionally, to Exhibit 1650, a declaration by Ryan Slate, because Patent Owner was not afforded an opportunity to depose the declarant. *Id.* at 4–5.¹⁹ Fourth, Patent Owner contends that Exhibits 1651–1654 and 1679 include hearsay, are irrelevant, are unfairly prejudicial, and lack foundation. *Id.* at 5. Fifth and finally, Patent Owner contends that Exhibits 1268, 1269, and 1270, and references to these exhibits in Ex. 1202, should be excluded under Federal Rules of Evidence 402, 403, and 1002. We address each of these categories in turn, below.

In opposition to this motion, Petitioners argue that Patent Owner's motion to exclude fails to follow our rules and procedures for a motion to exclude and that we should deny the motion, in its entirety, on that basis. Paper 100, 1–2 (quoting the Office Patent Trial Practice Guide, 77 Fed. Reg. at 48,767). We decline to deny Patent Owner's motion on this basis. We note that Petitioners' motion, which we addressed above, also fails to follow

¹⁹ Patent Owner does not address this evidence in reply to Petitioners' contention that this objection should be withdrawn. *See* Paper 100, 6; Paper 103. We do not address this exhibit further.

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the procedure outlined in the Office Patent Trial Practice Guide. *See* Paper 94.

a. Exhibits 1665–1669

Patent Owner argues that Exhibits 1665 through 1669 improperly incorporate attorney argument into Petitioners’ Reply. Paper 96, 1–3. These exhibits are directed to Petitioners’ allegations that Patent Owner improperly incorporates arguments from declarations into its Patent Owner Response. *See id.*

In opposition, Petitioners argue that Patent Owner does not cite any evidentiary basis for excluding these exhibits and that a motion to exclude is not the proper procedure to challenge these exhibits. Paper 100, 12 (referencing Trial Practice Guide Update, August 2018). Patent Owner replies that, by filing Exhibits 1665–1669, Petitioners exceeded the word count for a Reply. Paper 103, 2.

We do not exclude Exhibits 1665–1669. Patent Owner provides no evidentiary basis why these exhibits constitute inadmissible evidence. To the extent that these exhibits do contain attorney argument, the proper remedy in such a situation is for us, when considering Petitioners’ Reply arguments and evidence as a whole, to not consider any “arguments” found only in these exhibits and not adequately explained in the Reply. *See* Trial Practice Guide August Update 17–18; *cf.* Paper 76, 5 (addressing Petitioners’ motion to strike).

b. Exhibit 1625

Patent Owner argues that Dr. Beaman’s reply declaration mischaracterizes testimony from Patent Owner’s declarant in support of its

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preliminary response (Dr. Durfee), based on characterizations of the testimony from Petitioners' counsel. Paper 96, 3–4. Patent Owner also argues that addressing Dr. Durfee's testimony, which was not relied on in the Patent Owner Response, is outside the scope of a proper reply. *Id.* at 3.

Petitioners argue that Patent Owner does not provide a basis under the Federal Rules of Evidence to exclude Dr. Beaman's testimony. Paper 100, 5. Petitioners add that a motion to exclude should not be directed to arguments or evidence that a party believes exceeds the proper scope of a reply. *Id.* Finally, Petitioners argue that the testimony sought to be excluded identifies inconsistencies between Patent Owner's declarants' testimony. *Id.* at 6.

In reply, Patent Owner argues that Dr. Beaman's testimony lacks foundation. Paper 103, 3.

We do not exclude this evidence. Patent Owner did not rely on a lack of foundation in its objection to Dr. Beaman's testimony or in the original motion to exclude. *See* Paper 85, 5 (“Team Worldwide objects to the Reply Declaration of Joseph J. Beaman, Jr. (Exhibit 1625), which mischaracterizes Exhibit 2201 and/or exceeds the proper scope of reply.”); Paper 96, 3–4 (contending that portions of Exhibit 1625 “mischaracterize[] Patent Owner's early expert testimonial evidence (Exhibit 2201) and/or exceeds the proper scope of reply”). Accordingly, Patent Owner does not identify an evidentiary basis to exclude the evidence. Also, neither the motion nor the objection identifies, with particularity, those portions of Dr. Beaman's declarations to be excluded, as Patent Owner's citations were presented as exemplary only. *See id.*

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c. Exhibits 1651–1654 and 1679

Patent Owner argues that Exhibits 1651–1654 should be excluded as hearsay, are irrelevant, and lack proper foundation. Paper 96, 5. Patent Owner also argues that Exhibit 1679 does not lay the proper foundation for these exhibits. *Id.* at 8.

We deny Patent Owner’s motion as to these exhibits as moot, as we do not rely on them in this Decision. *See* Trial Practice Guide August Update 17 (“In the Board’s experience, consideration of the objected-to evidence is often unnecessary to resolve the patentability of the challenged claims, and the motion to exclude is moot.”).

d. Exhibits 1268, 1269, and 1270, and references to these exhibits in Ex. 1202

Patent Owner argues that Exhibits 1268, 1269, and 1270, and references to these exhibits in Ex. 1202 should be excluded, as Exhibits 1268, 1269, and 1270 are animations that do not accurately or completely represent the evidence underlying the animations. Paper 96, 10–11. We deny Patent Owner’s motion as to these exhibits as moot, as we do not rely on them in this Decision. *See* Trial Practice Guide August Update 17.

III. CONCLUSION

After considering the complete record, we determine that the information in the Petition fails to demonstrate, by a preponderance of the

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evidence, that any of the Challenged Claims are unpatentable.²⁰ Also, we deny Petitioners' and Patent Owner's motions to exclude evidence.

IV. ORDER

After due consideration of the record before us, it is:

ORDERED that no Challenged Claim has been shown to be unpatentable;

FURTHER ORDERED that Petitioners' and Patent Owner's motions to exclude (Papers 94, 96) are denied; and

FURTHER ORDERED that because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

²⁰ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

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Paper 133
Date: October 18, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEX RECREATION CORPORATION and
BESTWAY (USA) INC.,
Petitioner,

v.

TEAM WORLDWIDE CORPORATION,
Patent Owner.

IPR2018-00873
Patent 7,246,394 B2

Before BEVERLY M. BUNTING, JAMES J. MAYBERRY, and
ERIC C. JESCHKE, *Administrative Patent Judges*.

JESCHKE, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

ORDER
Denying Petitioner's Motion to Exclude
Denying Patent Owner's Motion to Exclude
37 C.F.R. § 42.64

APPX000347

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Intex Recreation Corporation and Bestway (USA) Inc. (collectively, “Petitioner”)¹ challenges the patentability of claims 1–12 and 16–23 (“the Challenged Claims”) of U.S. Patent No. 7,246,394 B2 (Ex. 1301, “the ’394 patent”), which is assigned to Team Worldwide Corporation (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6, and we issue this Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons below, we conclude that Petitioner has *not* proven by a preponderance of the evidence that any of claims 1–12 and 16–23 of the ’394 patent is unpatentable.

I. BACKGROUND

A. *Procedural History*

Petitioner filed a Petition seeking *inter partes* review of the Challenged Claims. Paper 1 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 8. We instituted a trial as to all the Challenged Claims on all asserted grounds. Paper 14 (“Decision on Institution” or “Dec. Inst.”).

During the trial, Patent Owner filed a Response (Paper 47, “PO Resp.”), Petitioner filed a Reply (Paper 76, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 83, “PO Sur-reply”).² Petitioner and Patent Owner also filed Motions to exclude evidence (Papers 102 and 103, respectively),

¹ Walmart Inc., Wal-Mart Stores Texas, LLC, Wal-Mart.com USALLC, and Sam’s West, Inc. d/b/a Sam’s Club (“the Walmart Entities”) were originally named as petitioners (Paper 1, 1); however, this proceeding was terminated with respect to the Walmart Entities during trial (Paper 99).

² Paper 48 is a public version of the Patent Owner Response. Paper 77 is a public version of the Petitioner’s Reply. Paper 84 is a public version of the Patent Owner Sur-reply.

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Oppositions to the Motions (Papers 104 and 105, respectively), and Replies to the Oppositions (Papers 110 and 108, respectively).

Petitioner relies on the declaration testimony of Dr. Joseph J. Beaman, Jr. (Exs. 1302 and 1625) and Mr. W. Todd Schoettelkotte (Ex. 1649). Patent Owner relies on the declaration testimony of Dr. Glen Stevick (Ex. 2329) and Dr. Stephen L. Becker (Ex. 2638). Oral argument was held on July 29, 2019, and a copy of the transcript of that argument was entered into the record. Paper 121 (public); Paper 122 (confidential) (“Tr.”).

B. Related Proceedings

The parties identify a prior proceeding in the U.S. District Court for the Eastern District of Texas (“the Texas District Court”) involving the ’394 patent: *Team Worldwide Corp. v. Walmart Inc. et al.*, No. 2:17-cv-00235-JRG (E.D. Tex.), filed March 29, 2017 (“the Texas Litigation”). Pet. 1–2; PO Resp. 1; Paper 93, 1; Paper 124, 2. The Texas District Court issued a claim construction order on March 15, 2018. Ex. 1363. On November 20, 2018, the Texas District Court dismissed the Texas Litigation with prejudice. Ex. 1680.

The Texas Litigation also involved U.S. Patent No. 9,211,018 B2 (“the ’018 patent”) and U.S. Patent No. 7,346,950 B2 (“the ’950 patent”). Pet. 2; PO Resp. 1. Petitioner filed four additional petitions for *inter partes* review of claims 1–12 and 16–23 of the ’394 patent in IPR2018-00870, IPR2018-00871, IPR2018-00872, and IPR2018-00874. Petitioner also filed petitions for *inter partes* review of (1) claims 1, 5, 7, and 11–14 of the ’018 patent, in IPR2018-00859, and (2) claims 1, 7, and 11–14 of the ’950 patent, in IPR2018-00875.

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The parties also identify the following proceedings in the Texas District Court involving the '394 patent, the '018 patent, and the '950 patent:

- (1) *Team Worldwide Corp. v. Macy's, Inc. and Macys.com, LLC*, No. 2:19-cv-00099-JRG (E.D. Tex.);
- (2) *Team Worldwide Corp. v. Target Corp. and Target Brands, Inc.*, No. 2:19-cv-00100-JRG (E.D. Tex.);
- (3) *Team Worldwide Corp. v. The Home Depot, Inc.*, No. 2:19-cv-00098-JRG (E.D. Tex.);
- (4) *Team Worldwide Corp. v. Dick's Sporting Goods, Inc.*, No. 2:19-cv-00097-JRG (E.D. Tex.);
- (5) *Team Worldwide Corp. v. Costco Wholesale Corp.*, No. 2:19-cv-00096-JRG (E.D. Tex.);
- (6) *Team Worldwide Corp. v. Bed Bath & Beyond, Inc.*, No. 2:19-cv-00095-JRG (E.D. Tex.);
- (7) *Team Worldwide Corp. v. Amazon.com, Inc. and Amazon.com LLC*, No. 2:19-cv-00094-JRG (E.D. Tex.);
- (8) *Team Worldwide Corp. v. Ace Hardware Corp.*, No. 2:19-cv-00093-JRG (E.D. Tex.); and
- (9) *Team Worldwide Corp. v. Academy, Ltd. d/b/a Academy Sports + Outdoors*, No. 2:19-cv-00092-JRG (E.D. Tex.).

Paper 93, 2–3; Paper 124, 4. According to Patent Owner, these nine proceedings are stayed pending the outcomes of IPR2018-00859 and IPR2018-00870 through -00875. Paper 93, 3.

Patent Owner also states it “filed a claim in *In re Sears Holding Corporation, et al.* chapter 11 bankruptcy cases pending before the United States Bankruptcy Court for the Southern District of New York, Case No. 18-23538 (RDD) (Jointly Administered) in which Patent Owner asserts infringement” of the '394 patent, the '018 patent, and the '950 patent. Paper 93, 3.

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C. The '394 Patent

The '394 patent, titled “Inflatable Product with Built-in Housing and Switching Pipe,” issued on July 24, 2007. Ex. 1301, codes (54), (45). It “relates in general to an inflatable product provided with an electric air pump.” *Id.* at 1:14–15. According to the '394 patent, prior air mattresses included inflatable chambers that “are inflated by an electric air pump . . . , which is separately provided, requiring users to carry two items, the air mattress itself, and an electric air pump” such that “[i]nconvenience results, especially for outdoor use.” *Id.* at 1:17–24. The '394 patent, in contrast, “provides a modified air mattress, which has a built-in electric air pump eliminating the need for an external pump.” *Id.* at 1:25–27.

Figure 1A is reproduced below:

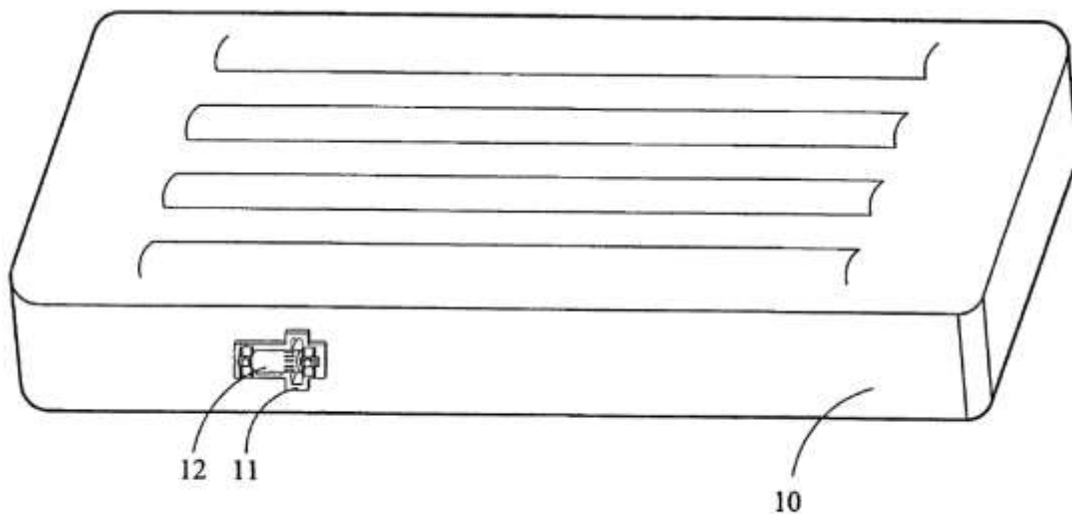


FIG. 1A

Figure 1A depicts “a perspective diagram of an inflatable product,” which includes inflatable chamber 10, pump seat 11, and air pump 12. Ex. 1301, 1:50–51, 3:15–21.

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Figures 3A and 3B are reproduced below:

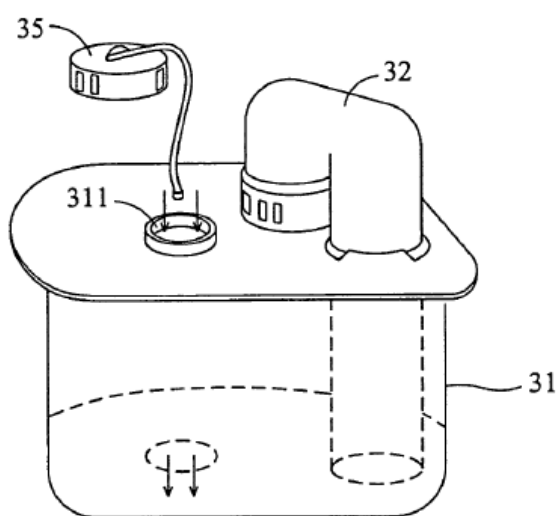


FIG. 3A

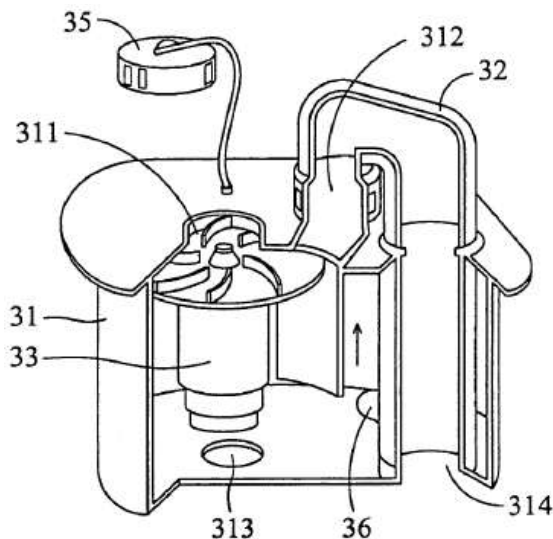


FIG. 3B

Figure 3A depicts an air pump of an embodiment of an inflatable product (as shown, for example, in Figure 1A) during inflation. Ex. 1301, 1:66–67. Figure 3B depicts the air pump of Figure 3A with portions of certain structures removed. *Id.* at 2:1–2. Figures 3A and 3B show, among other aspects, housing 31, fan and motor 33, switching pipe 32, flap 36, and cover 35. *Id.* at 4:13–16. For inflation, “the switching pipe 32 is connected to the air outlet 312 on the top surface of the housing 31” and “cover 35 is removed from the air intake 311.” *Id.* at 4:22–25.³ In this configuration, “[t]he inflatable product (not shown) is inflated by the fan and motor 33” as “[a]ir flows through the air intake 311 and the air outlet 313, and into the inflatable product.” *Id.* at 4:25–28.

³ Throughout this Decision, we omit any bolding of reference numerals in quotations from the '394 patent and from prior art references.

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Figures 3C and 3D are reproduced below:

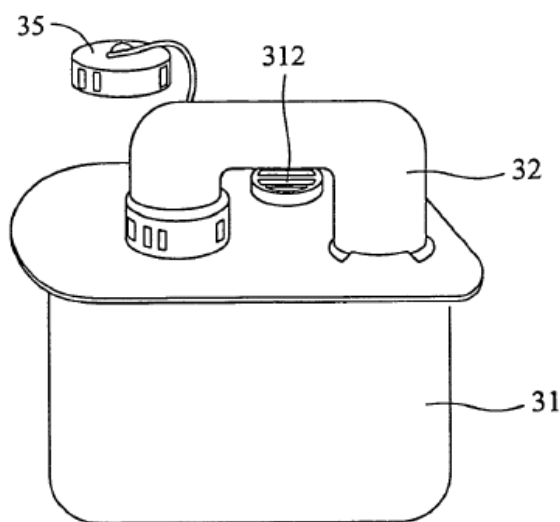


FIG. 3C

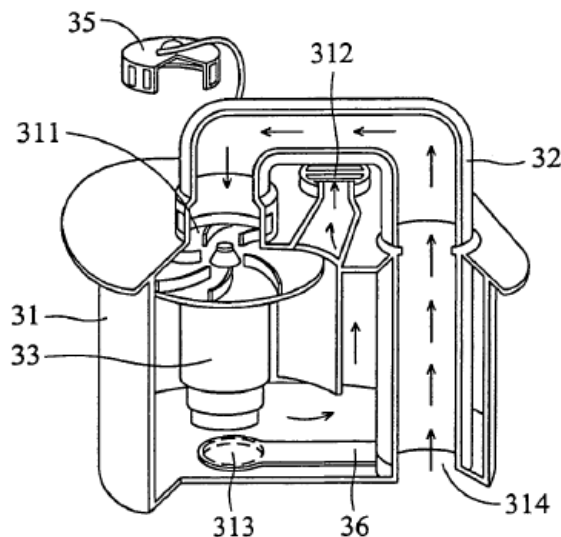


FIG. 3D

Figure 3C depicts an air pump of an embodiment of an inflatable product during deflation. Ex. 1301, 2:3–4. Figure 3D depicts the air pump of Figure 3C with portions of certain structures removed. *Id.* at 2:5–6. For deflation, “the switching pipe 32 is switched from the air outlet 312 to the air intake 311 on the top surface of the housing 31” and “the flap 36 follows the switching pipe 32 to rotate to close the air outlet 313 on the bottom surface of the housing 31.” *Id.* at 4:29–33. In this configuration, “air in the inflatable product is evacuated by the fan and motor 33” along the path indicated by arrows such that “[a]ir flows through the air intake 314, the switching pipe 32 and the air intake 311, and into the housing 31” and “out from the air outlet 312.” *Id.* at 4:33–38.

D. Illustrative Claims

Of the Challenged Claims, claims 1 and 16 are independent. Claims 2–12 depend from claim 1, and claims 17–23 depend from claim 16.

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Claim 1 is reproduced below:

1. An inflatable product including:
 - an inflatable body;
 - a fan and motor assembly for pumping air;
 - a housing built into the inflatable body, the housing having an interior region; and
 - an air conduit disposed at least in part in the housing, the air conduit being movable between a first position and a second position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;
- wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.

Ex. 1301, 8:24–38.

Claim 16 is reproduced below:

16. An inflatable product including:
 - an inflatable body;
 - a fan and motor assembly for pumping air;
 - a housing built into the inflatable body, the housing having an interior region; and
 - an air conduit having a first end and a second end, the air conduit disposed at least in part in the housing and arranged to convey air pumped by the fan and motor assembly, the air conduit being movable between a first position and a second position, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;

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wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation, and

wherein the fan and motor assembly causes air to be conveyed from the first end of the air conduit to the second end of the air conduit when the air conduit is in the first position, and the fan and motor assembly causes air to be conveyed in sequence from the inflatable body, through the second end of the air conduit, to the first end of the air conduit, to ambient when the air conduit is in the second position.

Ex. 1301, 9:38–10:19.

E. Instituted Grounds of Unpatentability

We instituted *inter partes* review of the Challenged Claims based on the following grounds of unpatentability asserted by Petitioner:

Claims Challenged	35 U.S.C. §	References
1–12 and 16–23	103	Parienti ⁴ and Renz ⁵
1–12 and 16–23	103	Parienti and Wu ⁶

II. ANALYSIS

A. The Level of Ordinary Skill in the Art

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). In the Decision on Institution, we adopted Patent Owner’s formulation of the level of ordinary skill in the art: one of

⁴ US 6,018,960, issued Feb. 1, 2000 (Ex. 1308, “Parienti”).

⁵ EP 0275896 A2 (and certified translation), published July 27, 1988 (Ex. 1371, “Renz”).

⁶ US 6,698,046 B1, issued Mar. 4, 2004 (Ex. 1305, “Wu”).

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ordinary skill in the art would have had either (1) a bachelor's degree in mechanical engineering or an equivalent field or (2) at least two years of experience in mechanical and electrical design aspects of inflatable products having electric air pumps. Dec. Inst. 13.

Following institution, neither Petitioner nor Patent Owner objected to this determination. *See* PO Resp. 20 (repeating the same formulation as stated prior to institution); *see also* Dec. Inst. 13 n.6 (discussing why we did not discern any special meaning for the term “designer” in Patent Owner’s formulation of the level of skill in the art for an individual without a bachelor’s degree in mechanical engineering). For the same reasons provided in the Decision on Institution (Dec. Inst. 12–14), we maintain this determination of the level of ordinary skill in the art for purposes of this Final Written Decision. Further, the patentability and claim construction analyses below would reach the same findings and determinations under either party’s definition of the level of ordinary skill in the art.

B. Claim Construction

In an *inter partes* review based on a petition filed prior to November 13, 2018, claim terms in an unexpired patent, such as the ’394 patent, are given their broadest reasonable construction in light of the specification.⁷ *See* 37 C.F.R. § 42.100(b) (2017); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable

⁷ Patent Owner’s contentions regarding the applicability of the district-court-type claim construction standard are inapposite because the Petition in this proceeding was filed prior to the rule change effective November 13, 2018. *See* PO Resp. 13–14, 13 n.3. Although the applicable version of Rule 42.100(b) permitted a party to request that the Board apply the district-court-type claim construction standard, Patent Owner did not provide either the required certification or the required request. *See* 37 C.F.R. § 42.100(b).

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interpretation standard as the claim construction standard to be applied in an *inter partes* review); *see also* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018). Under the broadest reasonable construction standard, claim terms are generally given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Petitioner proposes constructions for the terms “fan” (Pet. 24), “inflatable body” (*id.* at 25–26), and “pipe” (*id.* at 26–27). Patent Owner proposes constructions for the terms “built into” (PO Resp. 14–15), “inflatable body” (*id.* at 15–18), “pipe” (*id.* at 18–19), and “fan” (*id.* at 19). We determined in our Decision on Institution that express construction of only the term “built into” was necessary. Dec. Inst. 14–18.

Based on the full record developed at trial, we maintain that view for purposes of this Final Written Decision, as the determination as to the alleged obviousness of the Challenged Claims does not turn on the express interpretation of any of the remaining claim terms. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (stating that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). We discuss the term “built into” below.

Independent claims 1 and 16 each recite “a housing *built into* the inflatable body.” Ex. 1301, 8:27, 9:41 (emphasis added). In the Decision on

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Institution, we preliminarily construed “built into” in accordance with its plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” Dec. Inst. 18.

Patent Owner agrees with this construction. *See* PO Resp. 15 (stating that “‘built into’ should be construed as ‘integrated into and not detachable from’” (emphasis omitted)), 14 (stating that the preliminary construction “matches Patent Owner’s proposed definition”). Petitioner did not address this claim term in the claim construction section of the Petition or in the Reply. *See* Pet. 23–27; *see generally* Pet. Reply. Here, the parties agree on the construction of “built into,” but do not agree on the application of that construction to the asserted prior art. *See* Tr. 9:17–19 (counsel for Petitioner stating that “there’s no dispute about [the construction of ‘built into’] between the parties”), 56:19–21 (counsel for Patent Owner stating that “everybody seems to agree” on the construction of “built into”). We address the disagreements as to the *application* of this construction to the prior art in the discussion of the asserted grounds below.

Based on the complete record, for the reasons provided in the Decision on Institution, we maintain our construction of “built into” in accordance with its plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” *See* Dec. Inst. 15–18.

C. Asserted Obviousness of Claims 1–12 and 16–23 Based on Parienti and Renz

Petitioner asserts that claims 1–12 and 16–23 of the ’394 patent are unpatentable under 35 U.S.C. § 103(a) based on Parienti and Renz. Pet. 23, 31–64; Pet. Reply 1–13. Patent Owner provides arguments specifically addressing this asserted ground. PO Resp. 20–47; PO Sur-reply 1–12. We

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begin our analysis with an overview of the asserted prior art and then address the parties' specific contentions.

1. Parienti

Parienti discloses that the “invention is made up of an inflatable mattress and an associated device for automatic inflating and deflating of the mattress” and that “[t]h[e associated] device is made interdependent with the mattress by means of gluing or any other means.” Ex. 1308, 1:22–25.

Figure 1 of Parienti is reproduced below:

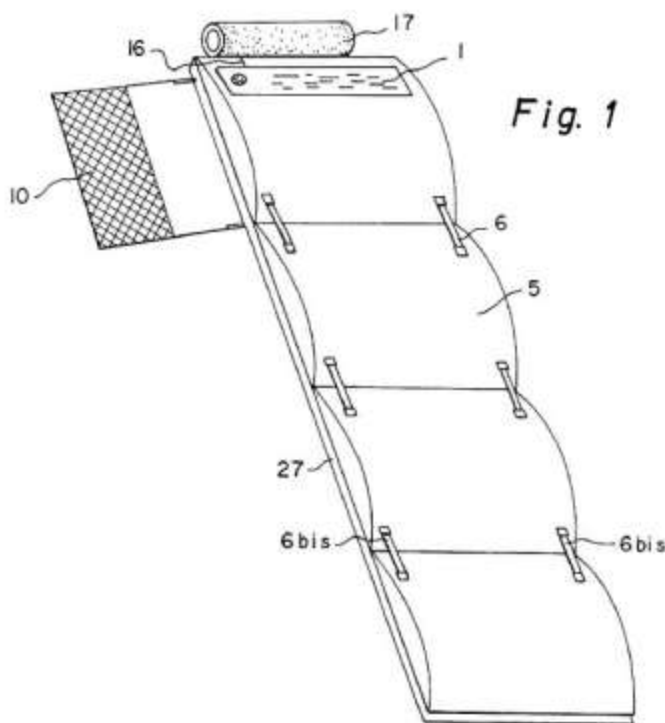


Figure 1 depicts “a plan view of the solar powered mattress of the . . . invention.” Ex. 1308, 1:36–37. The embodiment in Figure 1 shows, among other aspects, mattress 5, photovoltaic cells 1, and pipe 16, which may direct airflow to porous cylinder 17 for cooling a user. *See, e.g., id.* at 3:20–29.

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Figures 4 and 5 are reproduced below:

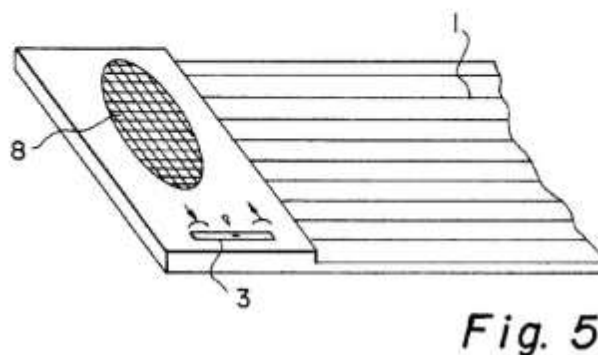
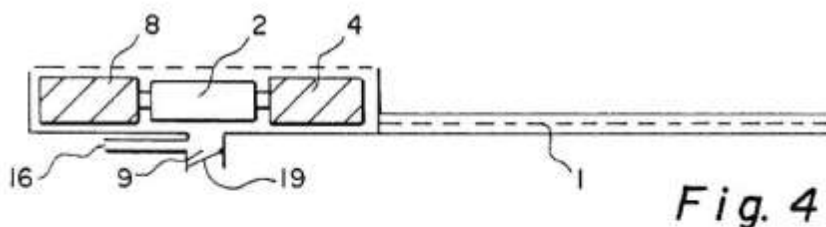


Figure 5 depicts “a plan view of a device for inflation/deflation of the solar powered mattress” and Figure 4 depicts a cross-sectional view of the device of Figure 5. Ex. 1308, 1:44–46. Parienti discloses:

Switching from inflating to deflating function is performed by reversing the polarity of the motor (2) that drives the turbine (4). Inflating is performed through the rotation of the turbine in one direction, what causes the suction of ambient air through the protective grid (8) and the introduction of the air into the mattress through the pipe (9). Likewise, deflating is performed through the rotation of the turbine in the reverse direction, what causes the suction of the air from the mattress and its exhausting to the exterior (FIG. 4).

Ex. 1308, 2:64–3:6.⁸

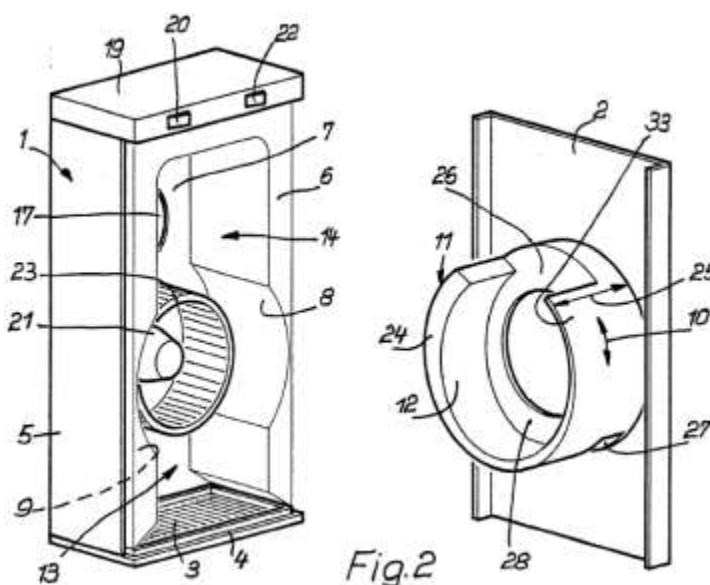
⁸ The lead line for protective grid 8 in Parienti’s Figure 4 mistakenly extends to a portion of turbine 4 rather than to protective grid 8, which is represented as the horizontal dashed line *above* turbine 4 and motor 2. *Compare* Ex. 1308, Fig. 4, *with id.* at Fig. 5.

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2. Renz

Renz “relates to a ventilation device with a radial fan, the propellable fan wheel of which is able to rotate in a fan housing with at least one inlet opening and one outlet opening” with a “first flow channel” from the fan housing to the interior of the space and a “second flow channel” from the fan housing to atmosphere. Ex. 1371, at 10.⁹

Figure 2 of Renz is reproduced below:



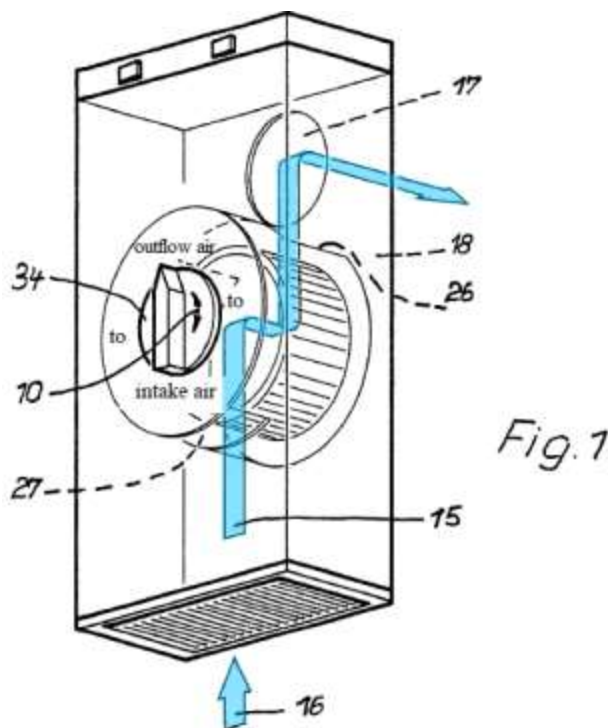
Ex. 1371, at 19 (Fig. 2). Figure 2 depicts “[a]n exploded view of the ventilation device, opened in the ‘outflow’ setting.” *Id.* at 14. The embodiment in Figure 2 shows, among other aspects, housing 1, first channel 13, second channel 14, fan motor 21, fan wheel 23, ventilation grille 3, fan housing 11, outlet opening 26, inlet opening 27, and front wall 2. *Id.* at 14–15. Renz discloses that “[w]hen front wall 2 is placed on, the fan

⁹ Exhibit 1371 includes both the original German publication and a certified translation in English. *See, e.g.*, Ex. 1371, at 21–22 (providing the translator’s declaration). When citing to Renz, we cite to the page number of Exhibit 1371 added by Petitioner.

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housing 11 adjoins [inner surfaces 8 and 9], able to rotate as per dual arrow 10, with no play or with minimal play.” *Id.* at 14.

An annotated version of Figure 1 of Renz is reproduced below:



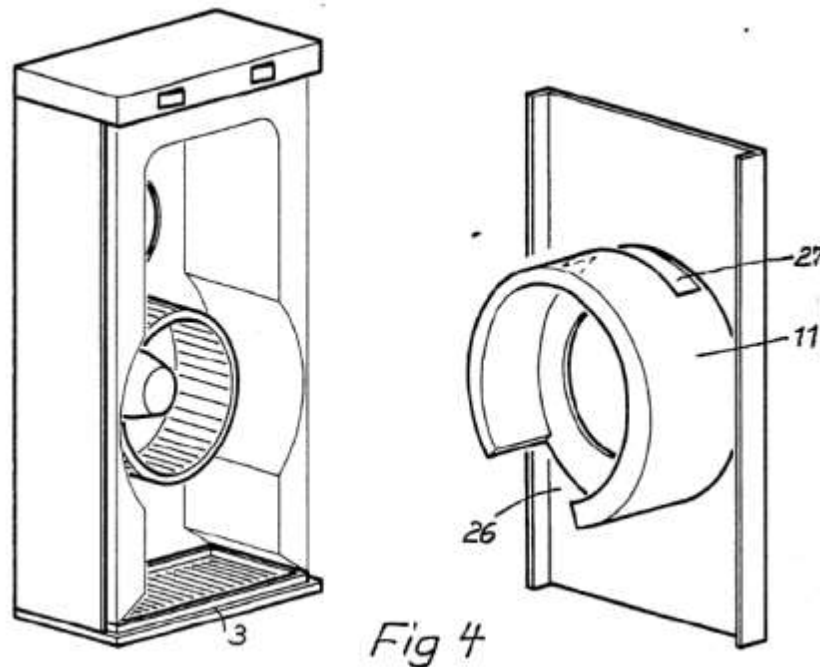
Ex. 1371, 19 (Fig. 1).¹⁰ Figure 1 depicts “[t]he ventilation device shown in perspective with a view of the underside.” *Id.* at 14. In the annotated version of Figure 1, we have added blue overlay to arrows 15, 16. Renz discloses that “[t]he flow path is visualized in figure 1 by the arrow 15” and that “[t]he space is subjected to ventilation outflow in this setting of fan housing 11.” *Id.* at 15. When the ventilation device is in the configuration shown in Figure 1, “[t]he room air passes as per arrow 16 via air grille 3 into the first channel, passes through the fan in the axial direction and then enters radially into second flow channel 14” in which “the air flow makes a right-

¹⁰ This version of Figure 1 has been modified by Petitioner to include translated text on the front of housing front wall 2. *Compare* Ex. 1371, 19 (Fig. 1 with English text), *with id.* at 7 (Fig. 1 with German text).

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angle deflection, to then flow out via opening 17 in the rear housing wall into the atmosphere.” *Id.*

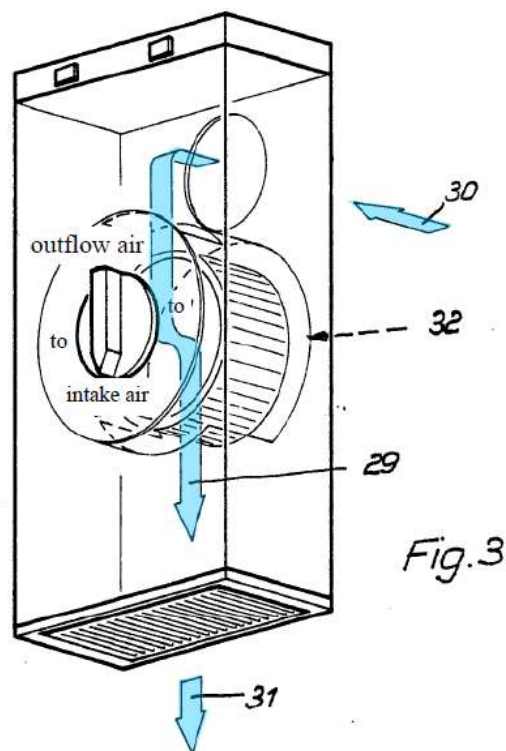
Figure 4 of Renz is reproduced below:



Ex. 1371, 20 (Fig. 4). Figure 4 provides a “[d]epiction[] as per figure[] 2, but in the ‘intake air’ setting.” *Id.* at 14. Renz discloses that “[i]n figure 4, fan housing 11 is rotated by 180° from the position as per figure 2” and “[a]s a result, the flow direction is reversed in the ventilation device, which is illustrated by the arrow 29 (figure 3).” *Id.* at 15.

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An annotated version of Figure 3 of Renz is reproduced below:



Ex. 1371, 20 (Fig. 3).¹¹ Figure 3 provides a “[d]epiction[] as per figure[] 1, but in the ‘intake air’ setting.” *Id.* at 14. In the annotated version of Figure 3, we have added blue coloring to arrows 29, 30, and 31. Renz discloses that “[t]he outer air flows as per arrow 30 into second flow channel 14, and flows via the now lower outlet opening 26 of radial fan 32 into first flow channel 13” and then “leaves same via air grille 3 and finally as per arrow 31 gets into the space equipped with this ventilation device.” *Id.* at 15.

¹¹ This version of Figure 3 has been modified by Petitioner to include translated text on the front of housing front wall 2. *Compare* Ex. 1371, 20 (Fig. 3 with English text), *with id.* at 8 (Fig. 3 with German text).

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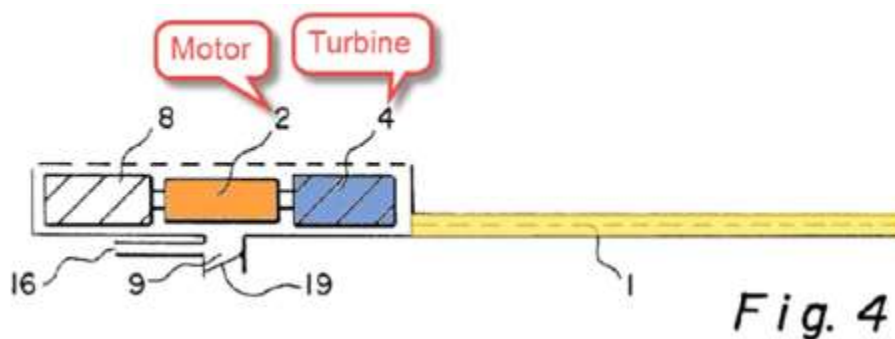
3. Analysis

a. Independent Claim 1

Petitioner contends that the proposed combination of Parienti and Renz satisfies each of the limitations of claim 1. Pet. 31–51. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage with respect to the corresponding claim limitation. *Id.* We first provide an overview of the proposed modification and then we discuss Petitioner’s positions with respect to the requirement in claim 1 for a “housing built into the inflatable body” (“the ‘built into’ limitation”). See Ex. 1301, 8:27.

(1) Overview of the Proposed Modification

Petitioner provides its annotated version of Figure 4 of Parienti shown below, and states that Parienti discloses “a pump device, including ‘a photovoltaic cell array (1) [yellow], a motor (2) [orange] powered by said cell array, [and] a [three] position switch (3) (FIG. 5).’” Pet. 32–33 (quoting Ex. 1308, 2:56–59). Petitioner contends that, in Parienti, “[s]witching from inflating to deflating function is performed by reversing the polarity of the motor (2) that drives the turbine (4) [blue].” *Id.* (quoting Ex. 1308, 2:64–66; citing Ex. 1302 ¶ 172).



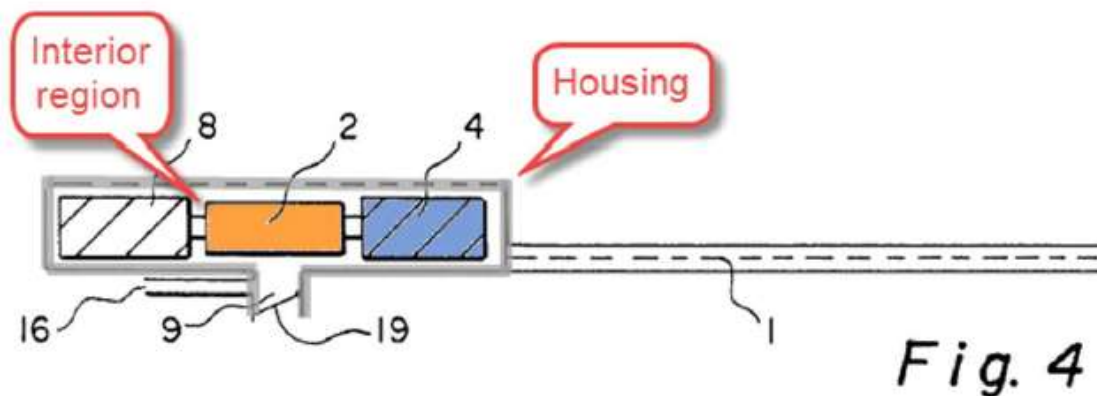
Pet. 33. Figure 4 depicts a cross-sectional view of a “device for inflation/deflation of the solar powered mattress.” Ex. 1308, 1:44–46. In

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the above annotated version of Parienti's Figure 4, Petitioner added (1) a text box identifying element 2 as a "Motor," (2) a text box identifying element 4 as a "Turbine," (3) an orange overlay to motor 2, (4) a blue overlay to a portion of turbine 4 (*see supra* n.8), and (5) a yellow overlay to photovoltaic cell array 1. Pet. 33. According to Petitioner, "Parienti's turbine 4 and motor 2 are part of a Reversible Pump Assembly." *Id.* (citing Ex. 1302 ¶¶ 113–115).

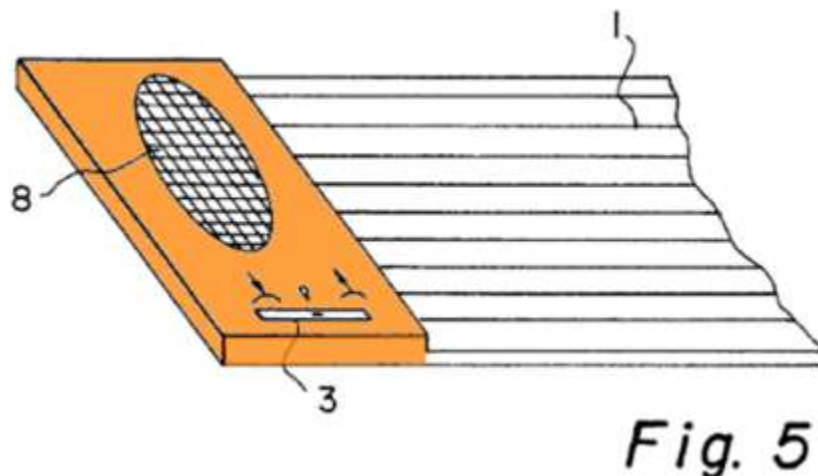
Petitioner also provides the following *additional* annotated version of Figure 4 of Parienti:



Pet. 38. Figure 4 depicts a cross-sectional view of a "device for inflation/deflation of the solar powered mattress." Ex. 1308, 1:44–46. In this annotated version of Figure 4 of Parienti, Petitioner added (1) an orange overlay to motor 2, (2) a blue overlay to a portion of turbine 4 (*see supra* n.8), (3) a text box identifying an "Interior region," and (4) a gray outline and text box identifying a "Housing." Pet. 38.

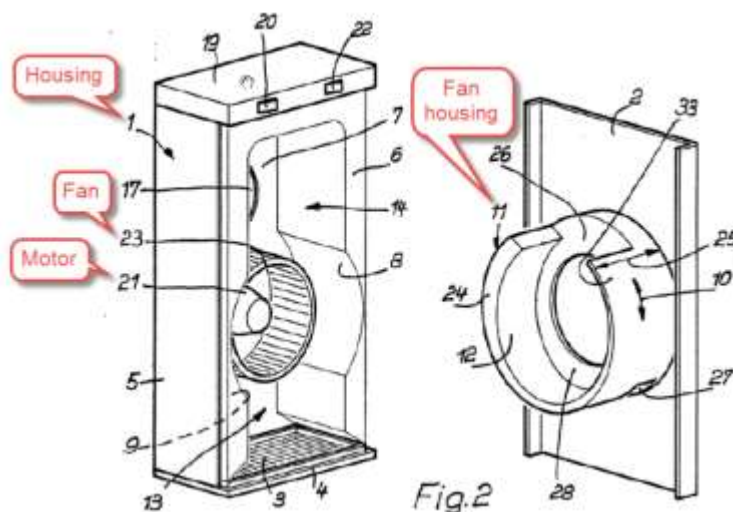
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In the background discussion of Parienti, Petitioner also identifies a “housing” in the following annotated version of Figure 5 of Parienti:



Pet. 30. Figure 5 of Parienti depicts “a plan view of a device for inflation/deflation of the solar powered mattress.” Ex. 1308, 1:46–47. The annotated version of Figure 5 above adds orange overlay to an alleged “housing.” See Pet. 29.

Petitioner also provides the following annotated version of Figure 2 of Renz below, and states that Renz discloses “a uni-directional fan 23 and motor 21 as part of a Uni-directional Pump Assembly for a ‘ventilation device.’” Pet. 33–34 (quoting Ex. 1371, 10; citing Ex. 1302 ¶¶ 119, 174):



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Pet. 35. Figure 2 depicts “[a]n exploded view of the ventilation device, opened in the ‘outflow’ setting.” Ex. 1371, at 14. In the annotated version of Figure 2 of Renz, Petitioner added text boxes to identify (1) element 1 as a “Housing”, (2) element 11 as a “Fan housing,” (3) element 21 as a “Motor,” and (4) element 23 as a “Fan.” Pet. 35. Petitioner provides various reasons why a person of ordinary skill in the art at the time of the invention would have allegedly “been motivated to use a Uni-directional Pump Assembly, as taught by Renz (*see* Renz, Figs. 1-4), in place of Parienti’s Reversible Pump Assembly.” Pet. 40; *see also id.* at 40–43 (providing five different reasons to modify Parienti as proposed).

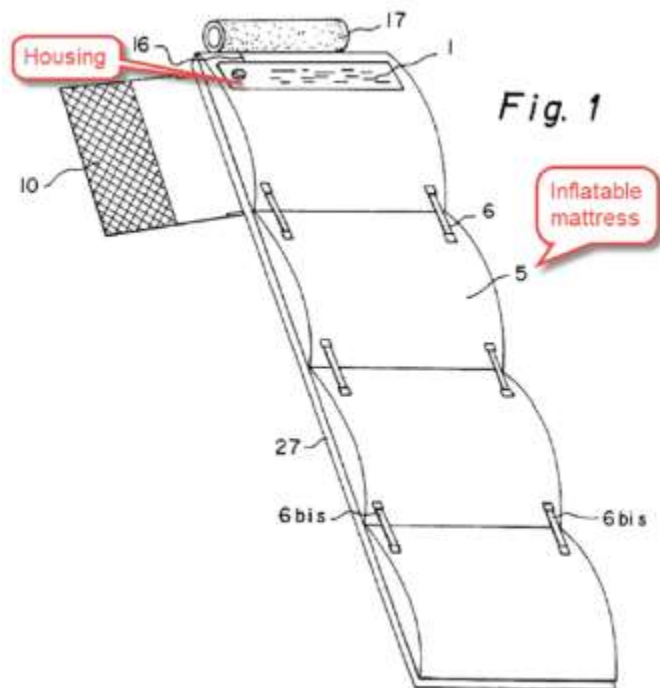
(2) The Parties’ Positions as to the “Built Into” Limitation

With that background, we turn now to the parties’ positions as to the “built into” limitation. Petitioner relies on the combination of Parienti and Renz for the “built into” limitation and the requirement for a “housing having an interior region” (Ex. 1301, 8:27–28) (“the ‘interior region’ limitation”). Pet. 36 (citing Ex. 1302 ¶ 176). Specifically, Petitioner asserts that “Renz disclose[s] a housing having an interior region” in mapping Renz to the “interior region” limitation. *Id.* (citing Ex. 1302 ¶ 179). Petitioner also asserts that the interior of Parienti’s housing contains a motor and turbine in mapping Parienti to the interior region limitation. *Id.* at 37 (citing Ex. 1308, Fig. 5; Ex. 1302 ¶ 177). Petitioner proposes to replace Parienti’s “pump device” with “the Uni-directional Pump Assembly as taught by Renz includes a housing 1 having an interior region.” *Id.* at 38 (citing Ex. 1302 ¶¶ 177–179).

As to the “built-into limitation,” Petitioner states that “Parienti disclose[s] that its pump housing is built into the inflatable mattress 5 (the

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inflatable body).” *Id.* at 38 (citing Ex. 1302 ¶ 180). More specifically, Petitioner refers to its annotated version of Figure 1 of Parienti below and states that “Parienti disclose[s] that the pump device, which is surrounded by a housing, ‘is made *interdependent* with the mattress [5] by means of gluing or any other means.’” *Id.* (quoting Ex. 1308, 1:24–25 (emphasis added); citing Ex. 1363, 23–24¹²):



Pet 39. Figure 1 depicts “a plan view of the solar powered mattress of the . . . invention.” Ex. 1308, 1:36–37. In this annotated version of Figure 1, Petitioner identifies (1) a “Housing” and (2) an “Inflatable mattress.” Pet. 39. Petitioner asserts that “Parienti described the benefit of this built in design as eliminating the ‘need to get an air pump’ separate from the

¹² Although Petitioner cites to pages 23–24 of Exhibit 1373 (Pet. 38), we understand Petitioner to have intended to refer to Exhibit 1363.

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inflatable mattress.” *Id.* at 38–39 (quoting Ex. 1308, 1:25–20; citing Ex. 1302 ¶ 180). According to Petitioner:

Because Parienti taught that its pump assembly is built into mattress 5 and specifically explained the benefits of such a design, a POSA would have known that the use of a Uni-directional Pump Assembly as taught by Renz in place [of] Parienti’s pump assembly would have resulted in an inflatable product with a pump assembly housing built into the inflatable body.

Id. at 39–40 (citing Ex. 1302 ¶ 181).

As discussed in the Decision on Institution, in the context of this asserted ground, the modified device includes, for example, housing 1, fan motor 21, and fan wheel 23 *from Renz*, but Petitioner proposes modifying housing 1 of Renz to be located and configured (with respect to mattress 5) the same way as the identified “housing” in Parienti in order to address the “built into” limitation. *See, e.g.*, Pet. 49 (showing an annotated version of Figure 7 of Parienti with the identified “housing” referred to as “Renz housing”). Petitioner confirmed this understanding during the oral hearing. Tr. 30:1–11.

Patent Owner responds that, even if combined, Parienti as modified by Renz does not satisfy the “built into” limitation. PO Resp. 41–47. Patent Owner asserts that the term “interdependent” as used in Parienti (Ex. 1308, 1:24–25) and relied on in the Petition, does not mean “not detachable from”—one of the requirements of “built into.”¹³ PO Resp. 41–43 (discussing Pet. 38). Patent Owner also argues that “[g]luing the

¹³ As discussed above, we construe “built into” in accordance with its plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” *See supra* § II.B.3.

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inflating/deflating device to the surface of Parienti does not cause it to be ‘integrated into’ the mattress”—the *other* requirement of “built into.” *Id.* at 44 (citing Ex. 2329 ¶ 117).

In addition, Patent Owner asserts that the “component collection” in Parienti is not “integrated into” mattress 5. PO Resp. 44–47.¹⁴ According to Patent Owner, “being *integrated into* the inflatable body means to construct the housing and the inflatable body such that the housing and the inflatable body as a ‘harmonious, interrelated whole’” such that “the housing itself forms a part of the inflatable body and is designed to hold air within the chamber like the other portions of the chamber wall which do not include the housing.” *Id.* at 46. Patent Owner asserts that “Parienti does not teach this,” but “[i]nstead, Parienti teaches placing its ‘housing structure’ *on* the outside wall of the mattress.” *Id.* (citing Ex. 2329 ¶¶ 117–122).

In its Reply, Petitioner argues that Parienti satisfies the “built into” limitation because (1) the identified “housing is not detachable from mattress 5” (Pet. Reply 1; *see id.* at 1–3 (discussing Ex. 1625 ¶¶ 16–18)),

¹⁴ It is unclear whether Patent Owner uses the term “component collection” to refer to the *same* collection of structures identified as a “housing” by Petitioner (*see* Pet. 38) or whether Patent Owner uses the term “component collection” to refer to a *subset* of Petitioner’s collection of structures. During the oral hearing, counsel for Patent Owner appears to indicate that the structures at issue in this discussion *do not* include pipe 9. *See* Tr. 158:18–159:2 (discussing how on pages 44 and 45 of the Response, Patent Owner “we didn’t talk about pipe per se but . . . did identify the thing that was the pump housing as being on top of the mattress and next to the solar panel which would not include pipe 9 and we said it right after the picture from Figure 7 so you would know that we were not including a pipe 9 because what we identified as the housing was on top of the mattress, not in the mattress”).

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and because (2) the identified “housing is integrated into mattress 5” in that “pipe 9 is part of [Parienti’s] pump housing and pipe 9 extends into mattress 5” (Pet. Reply 3; *see id.* at 3–4 (discussing Ex. 1625 ¶¶ 19–21)).

In its Sur-reply, Patent Owner argues that “Parienti’s air inflating/deflating device is not built into an inflatable body.” PO Sur-reply 1–3. Patent Owner states: “Petitioner[] argue[s] that pipe 9 is part of an alleged housing, but it is not.” *Id.* at 1. According to Patent Owner, “[p]ipe 9 is separated from the purported turbine housing by at least pipe 16.” *Id.* at 2; *see also* Ex. 1308, Fig. 4 (showing the relationship of pipe 9 to pipe 16).

*(3) Whether Petitioner’s Reply Arguments as to the
“Built Into” Limitation Are Proper*

We first address whether certain of Petitioner’s Reply arguments as to the “built into” limitation are proper. A petitioner has the ultimate burden of persuasion to prove unpatentability of the challenged claims, and the burden of persuasion never shifts to the patent owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). “Because of the expedited nature of IPR proceedings, ‘[i]t is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify “with particularity” the “evidence that supports the grounds for the challenge to each claim.”’” *Henny Penny Corp. v. Frymaster LLC*, No. 2018-1596, 2019 WL 4308876, at *4 (Fed. Cir. Sept. 12, 2019) (quoting *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (quoting 35 U.S.C. § 312(a)(3))); *see also* 37 C.F.R. § 42.104(b)(5) (requiring a petition to identify “the supporting evidence relied upon to support the challenge and the relevance of the evidence to the challenge raised, including identifying specific portions of the evidence that support the challenge”).

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A “[p]etitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g. to make out a prima facie case of unpatentability.” Trial Practice Guide Update, 14 (Aug. 2018), available at <https://go.usa.gov/xU7GP>. A reply that raises “new theories or arguments necessary to make out petitioner’s case-in-chief for the unpatentability of an original . . . claim” “may not be considered.” *Id.* at 15. Instead, under the Board’s rules, a petitioner’s reply “may only respond to arguments raised in the corresponding . . . patent owner response.” 37 C.F.R. § 42.23(b); *see also Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1367 (Fed. Cir. 2015) (discussing how, in *inter partes* reviews, a petitioner’s reply is “limited to a true rebuttal role” (citing 37 C.F.R. §§ 42.104(b)(5), 42.23(b))). The burden of persuasion assigned to a petitioner in *inter partes* review, “together with the procedural rules impartially applied, means that, in some cases, a challenge can fail even if different evidence and arguments might have led to success.” *Ariosa*, 805 F.3d at 1367.

As summarized above (*see supra* § II.C.3.a.2), in the Petition in this proceeding, Petitioner did not mention or rely on pipe 9 of Parienti as part of the basis for why the alleged “housing” in Parienti—as identified, for example, in the annotated version of Figure 4 reproduced above (*see supra* p. 20)—satisfies the “built into” limitation. *See* Pet. 38–40. Nor did Petitioner explain why its proposed replacement of Parienti’s “pump device” with Renz’s “Uni-directional Pump Assembly” would retain Parienti’s pipe 9 to satisfy the “built into” limitation. *See id.* at 38. Instead (as also summarized above (*see supra* § II.C.3.a.2)), Petitioner argued that Parienti satisfies that limitation because “Parienti disclose[s] that the pump device, which is surrounded by a housing, ‘is made interdependent with the mattress

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[5] by means of gluing or any other means.” *Id.* at 38 (quoting Ex. 1308, 1:24–25; citing Ex. 1363, 23–24). In other words, Petitioner *originally* asserted that the identified “housing” satisfied the “built into” limitation because Parienti discloses it being “interdependent,” e.g., glued to mattress 5. *Id.* at 38. Critically, Petitioner’s arguments in the Petition do not address the “integrated into” aspect of the “built into” limitation.

Then, in the Reply, Petitioner shifted its argument to focus on pipe 9 as the basis for Parienti satisfying the “integrated into” portion of the “built into” limitation. *See* Pet. Reply 3–4. Specifically, Petitioner now takes the position that “Parienti’s housing is integrated into mattress 5” because “Parienti teaches that pipe 9 is part of its pump housing structure and pipe 9 extends into mattress 5.” *Id.* at 3. Although we are mindful of the fact that, in the Decision on Institution, the panel stated that “[t]he parties may wish to further develop during trial whether Figure 7 (for example) of Parienti depicts a ‘Housing’ as ‘integrated into’ mattress 5 (in light of, for example, the relative locations of pipe 9 and mattress 5)” (Dec. Inst. 37), for the reasons discussed above, a petitioner cannot present, in a reply, a new argument necessary for its case-in-chief. *See Intelligent Bio-Sys.*, 821 F.3d at 1370 (“In these circumstances, we find that the Board did not err in refusing the reply brief as improper under 37 C.F.R. § 42.23(b) because [the petitioner] relied on an entirely new rationale to explain why one of skill in the art would have been motivated to combine” the prior art.); *Ariosa*, 805 F.3d at 1367 (“We see no error in the Board’s rejection of [a petitioner’s] reliance, in its Reply submissions, on previously unidentified portions of a prior-art reference to make a meaningfully distinct contention.”); Trial Practice Guide Update, 14 (“Petitioner may not submit new evidence or

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argument in reply that it could have presented earlier, e.g. to make out a prima facie case of unpatentability.”).

Relatedly, at the oral hearing, Petitioner asserted that Patent Owner’s Sur-reply arguments that pipe 9 is *not* part of an alleged housing is untimely. *See, e.g.*, PO Sur-reply 1. Specifically, counsel for Petitioner stated

despite the Panel’s invitation request to address whether pipe 9 is integrated into the mattress, there is nothing in the Patent Owner’s response on that issue, they only put in their arguments on that point in the [S]urreply, so we think that those raise new issues that they should have put in the response for us to address in the reply.

Tr. 24:4–8. Counsel for Patent Owner responded that pipe 9 “wasn’t raised . . . as a real point in the petition” and that “[t]he first time we got a full argument about pipe [9] was . . . in the reply and then we addressed it” in the Sur-reply. Tr. 158:1–3. We agree with Patent Owner on this issue.

As discussed above, Petitioner did not rely specifically on pipe 9 to address the “built into” limitation until the Reply. Contrary to Petitioner’s argument (Tr. 24:4–8), Patent Owner was *not* required to address pipe 9 in its Response when Petitioner did not provide a developed position on the issue in its Petition. In other words, Patent Owner did not need to rebut Petitioner’s arguments as to pipe 9 before those arguments were ever made. *See, e.g., Dynamic Drinkware*, 800 F.3d at 1379–80 (discussing the burdens of persuasion and production between parties in *inter partes* review); *see also* Tr. 158:15–17 (counsel for Patent Owner stating that Petitioner’s argument as to pipe 9 “wasn’t made before [the Reply] so we were responding to that in our sur reply”).

Given that the Decision on Institution identified the issue that Petitioner presented in its Reply, however, and in order to ensure a full and

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complete record, below we analyze two alternatives: (1) the outcome if Petitioner’s Reply Arguments *are not* considered (*see infra* § II.C.3.a.4), and (2) the outcome if Petitioner’s Reply arguments *are* considered (*see infra* § II.C.3.a.5). Our analysis as to the “built into” limitation does not turn on whether Petitioner’s argument is “new” or “responsive.”

(4) *Whether Petitioner, with the Arguments in the
 Petition, Has Demonstrated that the Identified
 “Housing” is “Integrated Into” Mattress 5*

We first discuss whether, if only the arguments in the Petition are considered, Petitioner has carried its burden of persuasion to support a finding by a preponderance of the evidence that the identified “housing” in Parienti satisfies the “built into” limitation. We determine that it has not.

We are persuaded by Patent Owner’s argument that the fact that the identified “housing” is “made interdependent with the mattress by means of gluing or any other means” (Ex. 1308, 1:24–25) does not *by itself* lead to the conclusion that it is “built into” mattress 5 in Parienti; instead, the cited disclosure in Parienti is relevant to only *one part* of the construction of “built into”—i.e., whether the identified “housing” is “detachable from” mattress 5 in Parienti. *See* PO Resp. 43 (“Petitioner[] allege[s] that structures that are ‘glued or welded’ are ‘built into’ according to the district court, (Petition, p. 38), but that ignores the ‘integrated into’ requirement. . . . Gluing the inflating/deflating device to the surface of Parienti does not cause it to be “integrated into” the mattress.” (citing Ex. 2329 ¶ 117)), 45 (“Petitioner[’s] conclusion that ‘glued to’ means ‘built into’ also ignores the district court’s full claim construction of ‘built into’ as meaning ‘*integrated into and* not detachable from.’”); *see also* Dec. Inst. 35 (discussing this issue).

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Further, we are not persuaded by Petitioner’s argument that the Texas District Court, in its claim construction order, “cit[ed] ‘glued or welded’ as examples of built in structures.” Pet. 38 (citing Ex. 1363, 23–24); *see supra* n.12. As discussed in the Decision on Institution, the Texas District Court’s reference to “glued or welded” comes in a discussion of the term “permanently held” in the ’018 patent. Dec. Inst. 34–35.

For these reasons, if Petitioner’s arguments relying on pipe 9 as to the “integrated into” aspect of the “built into” limitation (Pet Reply 3–4) *are not* considered, Petitioner has not shown by a preponderance of the evidence that the identified “housing” in Parienti satisfies the “built into” limitation. Under that assumption, we determine, based on the otherwise complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claim 1 would have been obvious based on Parienti and Renz.

*(5) Whether Petitioner, with the Arguments in the
 Petition and Reply, Has Demonstrated that
 Parienti Satisfies the “Integrated Into” Aspect
 of the “Built Into” Limitation*

In the alternative to the analysis in the prior section, we also discuss whether Petitioner has carried its burden of persuasion to support a finding by a preponderance of the evidence that Parienti satisfies the “built into” limitation if the arguments at issue in the Reply are considered. *See* Pet Reply 3–4. For the reasons below, we determine that Petitioner still has not carried its burden.

We first discuss whether Petitioner has shown by a preponderance of the evidence that pipe 9 in Parienti would have been understood by one of ordinary skill in the art to be part of a “housing.” In the Petition, Petitioner provides the annotated version of Figure 4 of Parienti shown above (*see*

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supra p. 20), which adds gray overlay to pipe 9 to identify it as part of an alleged “housing” (Pet. 38), but neither Petitioner nor Dr. Beaman explain *why* one of ordinary skill in the art would have considered pipe 9 as part of a “housing.” *See* Pet. 36–40 (citing Ex. 1302 ¶¶ 176–181). Indeed, Petitioner does not mention pipe 9 in the analysis of the “interior region” limitation of the “built into” limitation. *See* Pet. 36–40. Similarly, Dr. Beaman does not discuss pipe 9 in the testimony cited. *See* Ex. 1302 ¶¶ 176–181.

In the Reply, Petitioner states that “Parienti teaches that pipe 9 is part of its pump housing structure and pipe 9 extends into mattress 5.” Pet. Reply 3 (citing Ex. 1625 ¶¶ 19–20). Patent Owner argues that pipe 9 is not “part of an alleged housing” as asserted by Petitioner. PO Sur-reply 1. We address Petitioner’s Reply arguments in detail below.

Although Dr. Beaman does state, in the declaration in the Reply, that “Parienti’s housing is integrated into inflatable mattress 5 via at least pipe 9,” with that testimony, Dr. Beaman assumes, without support, that pipe 9 is part of the “housing” in the first place. Ex. 1625 ¶ 19. Petitioner also states that Patent Owner’s expert “Dr. Stevick agrees that pipe 9 is built into mattress 5.” Pet. Reply 3 (citing Ex. 1602, 714:3–8; Ex. 1647 ¶ 62). In the cited deposition testimony, when Dr. Stevick is asked whether he “believe[s] that the pipe 9 that holds the valve 19 is a separate part from the housing that has the motor and turbine” in Parienti, he stated “Yes. And you build that into the mattress.” Ex. 1602, 714:3–8; *see also* PO Sur-reply 2–3 (“Petitioner[’s] allegation that Dr. Stevick admitted, in IPR2018-0875, that pipe 9 is built in the mattress 5 is false. He stated that pipe 9 is **not** part of the alleged housing. *See, e.g.,* IPR2018-0875 Stevick Declaration, Ex. 1647, ¶ 62.”). Again, with this argument, Petitioner assumes that pipe 9 is part of

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a “housing” in the first place; indeed if pipe 9 is not part of a “housing,” whether pipe 9 is “built into” mattress 5 in Parienti is not relevant to whether Parienti discloses a “housing built into the inflatable body.” Similarly, although Dr. Stevick testified (in the cited declaration from IPR2018-00875) that “at most, only pipe 9 *and not* the pump is built in the chamber wall” (Ex. 1647 ¶ 62), that, again, does not address whether pipe 9 is part of a “housing” in the first place.

Petitioner makes three additional statements on this issue in the Reply: (1) “Parienti’s Figure 4 ‘is a cross-section of the device shown in FIG. 5 . . . ’ ([Ex. 1625 ¶¶ 19–20]);” (2) “Parienti’s Figure 5 shows a ‘housing,’”; and (3) “Figure 4 clearly shows pipe 9 as part of that housing. ([Ex. 1625 ¶¶ 19–20]; Ex. 1634, 248:20–249:9).” Pet. Reply 3. The record supports Petitioner’s position on point (2)—i.e., that the box-shaped structure shown in Figure 5 (overlaid in orange in the annotated version above (*see supra* p. 21)) is a “housing.” *See, e.g.*, Ex. 1602, 701:9–10 (Patent Owner’s expert, Dr. Stevick, stating that “Figure 5 [of Parienti] shows a housing with a switch and a grid and a solar cell”); Ex. 1634, 245:15–23 (Dr. Stevick stating that “[y]ou could call” the device shown in Figure 5 a “housing”). As shown by comparing Figures 4 and 5, this box-shaped structure houses motor 2 and turbine 4. *See* Ex. 1308, Figs. 4, 5. The record also supports Petitioner’s position on point (1), as Parienti discloses that Figure 4 “is a cross-section of the device shown in” Figure 5. Ex. 1308, 1:44–46.

We turn now to point (3)—that “Figure 4 clearly shows pipe 9 as part of that housing,” i.e., in Figure 5. Pet. Reply 3 (citing Ex. 1625 ¶¶ 19–20; Ex. 1634, 248:20–249:9). We do not agree with Petitioner that point (3) necessarily follows from the prior two. Petitioner has not explained why—

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under the logic that Figures 4 and 5 show the same “device” (*id.*)—one of ordinary skill in the art *would have included* pipe 9 in the alleged “housing” *but not included* other structures shown in Figure 4, such as, for example, pipe 16. Instead, the gray line identifying the “housing” in the annotated version of Figure 4 spans *across the inlet* of pipe 16, omitting it from the identified “housing.” *See* Pet. 38. In the cited declaration of Dr. Beaman, he essentially restates Petitioner’s points (1), (2), and (3), but does not provide further explanation for his statement that “there can be no reasonable dispute that pipe 9 is part of Parienti’s housing.” Ex. 1625 ¶ 20 (citing Ex. 1308, Figs. 4 and 5; Ex. 1634, 248:20–249:23, 250:18–251:7); *see* 37 C.F.R. § 42.65(a).

Further, in deposition testimony of Dr. Stevick highlighted by Petitioner (Pet. Reply 3) and Dr. Beaman (Ex. 1625 ¶ 20), Dr. Stevick discusses how pipe 9 could be screwed into or welded to “the housing that holds motor [2] and turbine [4].” Ex. 1634, 248:12–249:11; *see id.* at 249:1–2 (Dr. Stevick discussing how “you could have the pipe [9] screw into a threaded fitting on a housing”). Taken in context, however, we are not persuaded that this testimony supports the proposition for which Petitioner cites it—i.e., that “Figure 4 clearly shows pipe 9 as part of that housing” (Pet Reply 3). Instead, in a portion of testimony cited by Dr. Beaman (but not by Petitioner), it is clear that Dr. Stevick takes the position that “pipe 9 is separate from the housing.” Ex. 1634, 249:17–23 (“**Q:** Okay. So under the way you’re looking at this, *where pipe 9 is separate from the housing*, you’re saying that pipe 9 could be screwed into the housing or 20 welded into the housing, correct? **A:** Sure. And that’s why it’s -- it has a separate number. They don’t call [pipe] 9 a housing.” (emphasis added)), *cited at* Ex.

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1625 ¶ 20.¹⁵ On the record in this proceeding, this testimony of Dr. Stevick does not support Petitioner’s position as contended by Petitioner.¹⁶ For the reasons above, even if the Reply arguments are considered, we determine that Petitioner has not shown by a preponderance of the evidence that one of ordinary skill in the art would have considered pipe 9 in Parienti as part of a “housing.”

We turn now to whether Petitioner has have shown by a preponderance of the evidence that the remaining structure—i.e., if pipe 9 is *not* included in the identified “housing” (*see* Pet. 38)—is “integrated into” mattress 5 in Parienti. In the Reply, Petitioner argues in the alternative that,

¹⁵ We note that Dr. Beaman also cites to the portion of Dr. Stevick’s deposition that discusses certain features in Figure 4C of the ’950 patent. *See* Ex. 1625 ¶ 20 (citing Ex. 1634, 250:18–251:7). Although the Reply also cites this testimony (Pet. Reply 4), Petitioner does not address either Figure 4C or this testimony by Dr. Stevick as a basis for why one of skill in the art would consider pipe 9 to be part of a “housing.” Thus, we do not consider this testimony as to Figure 4C in our analysis. *See* Trial Practice Guide Update, 4 (discussing how “parties that incorporate expert testimony by reference in their petitions, motions, or replies without providing explanation of such testimony risk having the testimony not considered by the Board”).

¹⁶ This understanding of pipe 9 as separate from a “housing” aligns with Patent Owner’s argument that the remaining structure—i.e., if pipe 9 is *not* included in the identified “housing” (*see* Pet. 38)—is “*on the outside wall of the mattress.*” PO Resp. 46 (citing, *inter alia*, Ex. 2329 ¶ 121); *see also* Tr. 158:18–159:2 (discussing how on pages 44 and 45 of the Response, Patent Owner “we didn’t talk about pipe per se but . . . did identify the thing that was the pump housing as being on top of the mattress and next to the solar panel which would not include pipe 9 and we said it right after the picture from Figure 7 so you would know that we were not including a pipe 9 because what we identified as the housing was on top of the mattress, not in the mattress”).

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even if pipe 9 is *not* part of a “housing,” the remaining structure “is integrated with mattress 5 by [Patent Owner’s] own cited definitions of ‘integrate.’” Pet. Reply 3 (citing PO Resp. 46).¹⁷ In support, Petitioner argues that “Parienti teaches that the first embodiment pump is made ‘*interdependent*’ with the mattress by means of gluing or any other means,” such that a user need not separately retrieve a pump.” *Id.* (citing Ex. 1625 ¶ 21). Petitioner also argues that “[t]his non-detachable pump provides a ‘harmonious, interrelated whole with’ the mattress, as the pump housing extends into the mattress and keeps it inflated.” *Id.* at 4 (citing Ex. 1625 ¶ 21; Ex. 1634, 250:18–251:7, 253:13–21, 254:10–14, 256:1–257:22).

As an initial matter, for the reasons discussed above (*see supra* § II.C.3.a.4), we are persuaded by Patent Owner’s argument that the fact that a structure is “made interdependent with the mattress by means of gluing or any other means” (Ex. 1308, 1:24–25) does not *by itself* lead to the conclusion that the structure is “built into” mattress 5 in Parienti as we have defined this term; instead, that fact only addresses *one part* of the construction of “built into”—i.e., whether the structure is “detachable from” mattress 5 in Parienti

Further, we are not persuaded that the identified “housing” *without* pipe 9 satisfies Patent Owner’s own understanding of “integrated into.” Although Patent Owner did use the phrase “harmonious interrelated whole”

¹⁷ Although Petitioner does not expressly state that this argument assumes pipe 9 is *not* part of the “housing,” in the cited declaration testimony, Dr. Beaman begins: “Regardless of pipe 9, though, I consider Parienti’s pump housing to be integrated with mattress 5 by Dr. Stevick’s own cited definitions of ‘integral’ and ‘integrate.’” Ex. 1625 ¶ 21, *cited at* Pet. Reply 3.

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when discussing “integrated into” (PO Resp. 46), Patent Owner also clearly stated that “integrated into” means that “the housing itself *forms a part of the inflatable body and is designed to hold air* within the chamber like the other portions of the chamber wall which do not include the housing.” *Id.* (emphasis added); *see also* Tr. 57:9–11 (counsel for Patent Owner stating that “integrated into” means “you have to remove part of the inflatable body wall, and this has to become that part of the wall”).

Although we do not necessarily agree with Patent Owner’s view that “integrated into” requires the “housing” to take the place of a portion of the wall of the “inflatable body” (*see* PO Resp. 46; Tr. 57:9–11), we do agree that “integrated into” requires *at least some* level of recess of the “housing” *into* the “inflatable body.”¹⁸ Petitioner focuses on “integrate” (Pet. Reply 3), but the phrase at issue from our construction (and that of the Texas District Court) is “integrated *into*.” That phrase, in turn, reflects the claim language “built *into*.” The understanding that “built into” requires at least some level of recess of the “housing” into the “inflatable body” is also supported by the Specification, which, for example, describes pump assembly 43 in Figure 4A as “*built into* the mattress pad 41.” Ex. 1301, 4:39–43 (emphasis added).

Here, if pipe 9 is not part of the “housing,” the remaining structure is, as argued by Patent Owner, merely glued “*on* the outside wall of the mattress.” PO Resp. 46 (“Instead, Parienti teaches placing its ‘housing structure’ *on* the outside wall of the mattress.” (citing Ex. 2329 ¶¶ 117–122)); *see supra* § II.C.3.a.4. This does not satisfy the at-least-partial recess requirement discussed above. Thus, even if the arguments in the Reply as to

¹⁸ This at-least-partial recess requirement is necessary, but may not be sufficient to satisfying “integrated into.”

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the “integrated into” aspect of the “built into” limitation (Pet. Reply 3–4) *are* considered, Petitioner has not shown by a preponderance of the evidence that Parienti satisfies the “built into” limitation.

In view of the foregoing, we determine, based on the complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claim 1 would have been obvious based on Parienti and Renz.

b. Dependent Claims 2–12

Claims 2–12 depend from claim 1. *See* Ex. 1301, 8:40–9:9. For the reasons discussed above as to claim 1 in the context of this asserted ground, we determine, based on the complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claims 2–12 would have been obvious based on Parienti and Renz.

c. Claims 16–23

For independent claim 16 and claims 17–23, which depend from claim 16, Petitioner references their positions with respect to claims 1–9, 11, and 12. *See* Pet. 63–64. For the reasons discussed above as to claim 1 in the context of this asserted ground, we determine, based on the complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claims 16–23 would have been obvious based on Parienti and Renz.

D. Asserted Obviousness of Claims 1–12 and 16–23 Based on Parienti and Wu

Petitioner asserts that claims 1–12 and 16–23 of the ’394 patent are unpatentable under 35 U.S.C. § 103(a) based on Parienti and Wu. Pet. 23, 64–93; Pet. Reply 13–21. Patent Owner provides arguments specifically addressing this asserted ground. PO Resp. 47–67; PO Sur-reply 13–20. We begin our analysis with an overview of the asserted prior art and then address the parties’ specific contentions.

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I. Wu

In this ground, Petitioner relies on Wu, in addition to Parienti (*see supra* § II.C.1). Wu is generally directed to a system for controlling air flow into chambers of an air mattress. Ex. 1305, 1:12–14.

Figure 1 of Wu is reproduced below:

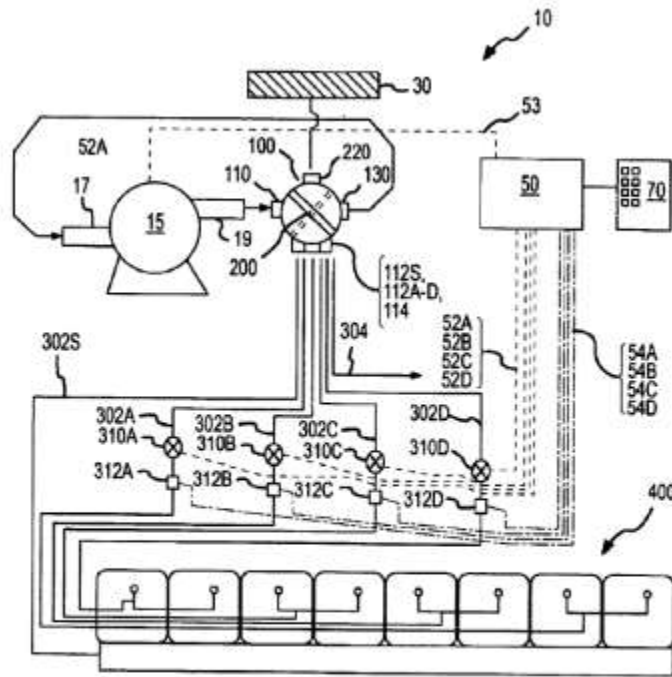


FIG.1

Figure 1 depicts a schematic representation of the overall disclosed system 10, which includes, among other aspects, electric motor powered blower 15, two-position rotary valve 100, and air mattress supply lines 302A–D and 302S for supplying air to air mattress 400. Ex. 1305, 2:43–48. Included in rotary valve 100 is gate member 200, which is shown in Figure 1 “in a first position for directing air flow in a pressurizing mode.” *Id.* at 3:3–8. Wu discloses that “[w]hen gate member 200 is in the first position, air can flow through inlet port 110 of housing 101, into the second portion of

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gate member 200 and then out through air mattress supply ports 112S, 112A, 112B, 112C and 112D and exhaust port 114.” *Id.* at 5:56–60.

The system can be deflated by turning gate member 200 “to a second position shown in phantom” in Figure 1. Ex. 1305, 4:48–53. According to Wu, “[w]hen in the second position, gate member 200 directs air from air mattress 400 into intake 17 of blower 15 while air leaving blower 15 is directed through filter 30 to the outside environment.” *Id.* at 4:54–57.

Figure 2 is reproduced below:

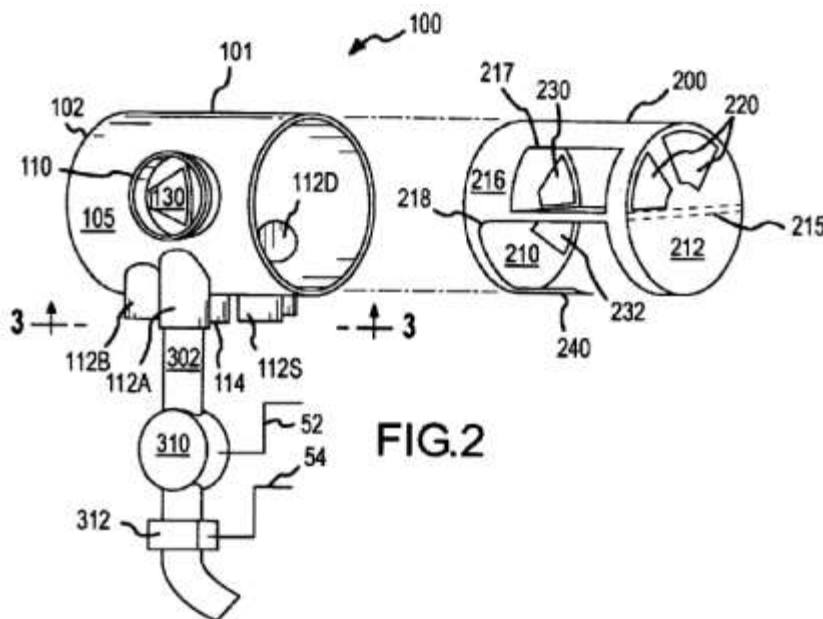


Figure 2 depicts a perspective view of rotary valve 100. Ex. 1305, 2:36–37, 4:60–61. As shown, rotary valve 100 includes cylindrically shaped valve housing 101 with outer wall 105, which includes inlet port 110 that connects with exhaust port 19 of blower 15. *Id.* at 4:61–66. Outer wall 105 also includes exhaust ports that supply air to air mattress 400’s air supply ports. *Id.* at 4:66–5:1.

Gate member 200 fits within valve housing 101 and includes two end walls that close gate member 200 within valve housing 101. Ex. 1305, 5:9–

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19. Horizontal wall 215 divides gate member 200 into two sections. *Id.* at 5:19–22. The port arrangement in gate member 200 and valve housing 101 allows the valve to operate in a first position that allows air to be delivered to air mattress 400 and a second position that allows air mattress 400 to be deflated. *Id.* at 5:44–48.

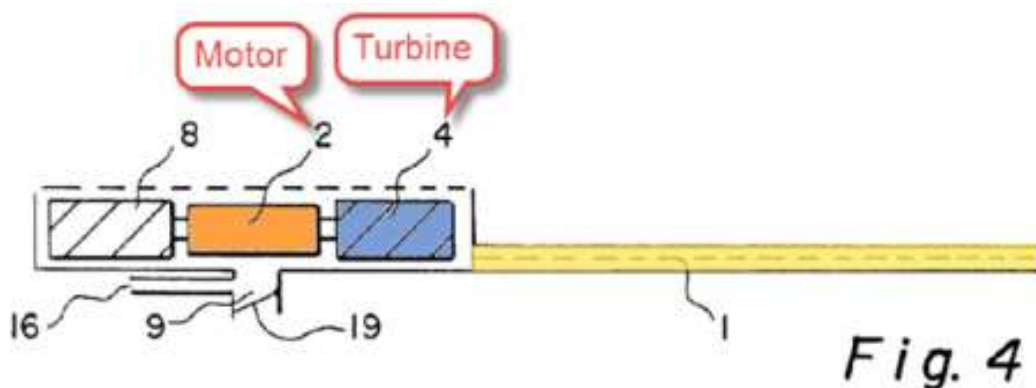
2. Analysis

a. Independent Claim 1

Petitioner contends that the proposed combination of Parienti and Wu satisfies each of the limitations of claim 1. Pet. 65–84. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage with respect to the corresponding claim limitation. *Id.* We first provide an overview of the proposed modification and then we discuss Petitioner’s positions with respect to the “built into” limitation.

(1) Overview of the Proposed Modification

In discussing this asserted ground, Petitioner refers back to the annotated version of Figure 4 of Parienti shown below and to a discussion in the context of the asserted ground of Parienti and Renz, and state that Parienti discloses “a Reversible Pump Assembly including a motor 2 and turbine 4.” Pet. 65 (citing Ex. 1302 ¶ 260; referencing Pet. 32–36).



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Pet. 33. Figure 4 depicts a cross-sectional view of a “device for inflation/deflation of the solar powered mattress.” Ex. 1308, 1:44–46. In the annotated version of Figure 4 of Parienti, Petitioner added (1) a text box identifying element 2 as a “Motor,” (2) a text box identifying element 4 as a “Turbine,” (3) an orange overlay to motor 2, (4) a blue overlay to a portion of turbine 4 (*see supra* n.8), and (5) a yellow overlay to photovoltaic cell array 1. Pet. 33.

Petitioner also provides the annotated version of Figure 1 of Wu below, and state that Wu discloses “a Uni-directional Pump Assembly, including blower 15 and rotary valve 100, ‘for supplying air and controlling the flow of air into and out of the chambers of a patient supporting air mattress [400].’” Pet. 67–68 (quoting Ex. 1305, Abstract, 2:44–47) (citing Ex. 1302 ¶ 125; Ex. 1366, 4:4–6, 15:5–6).

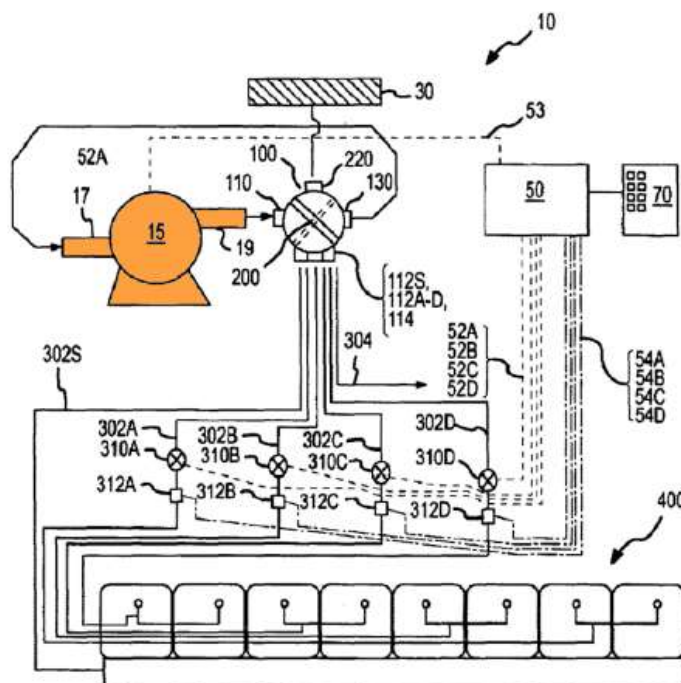


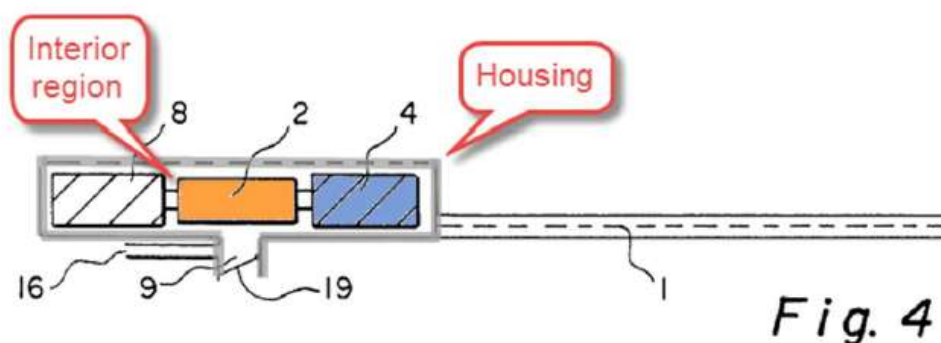
FIG.1

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Pet. 68. Figure 1 depicts a schematic representation of the overall disclosed system 10, which includes, among other aspects, electric motor powered blower 15, two-position rotary valve 100, and air mattress supply lines 302A–D and 302S for supplying air to air mattress 400. Ex. 1305, 2:43–48. In the annotated version of Figure 1 of Wu, Petitioner added an orange overlay to electric motor powered blower 15. Pet. 68. Petitioner asserts that a person of ordinary skill in the art at the time of the invention “would have been motivated to convert Parienti’s Reversible Pump Assembly into a Uni-directional Pump Assembly in view of Wu’s teachings” for various reasons. Pet. 71–72 (citing Pet. 40–47; Ex. 1302 ¶ 268).

Petitioner also provides the following annotated version of Figure 4 of Parienti:



Pet. 70. Figure 4 depicts a cross-sectional view of a “device for inflation/deflation of the solar powered mattress.” Ex. 1308, 1:44–46. In the annotated version of Figure 4 of Parienti here, Petitioner added (1) an orange overlay to motor 2, (2) a blue overlay to a portion of turbine 4 (*see supra* n.8), (3) a text box identifying an “Interior region,” (4) a gray outline and text box identifying a “Housing.” Pet. 70.

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Petitioner also provides the annotated version of Figure 1 of Wu shown below:

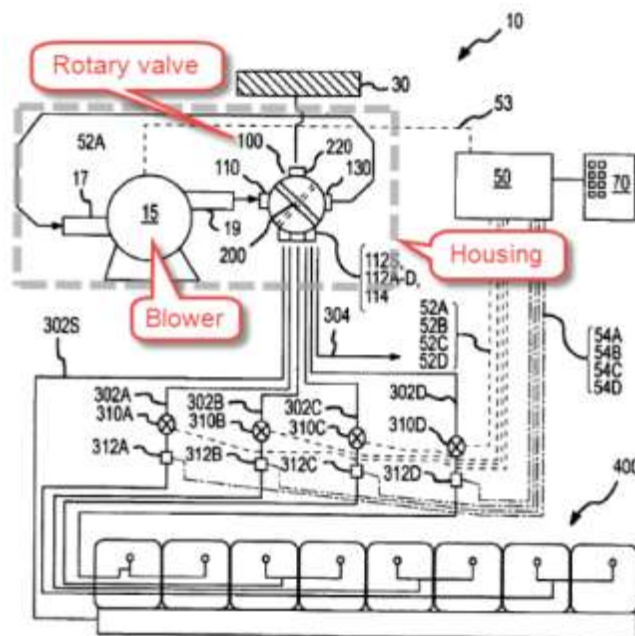


FIG. 1

Pet. 73. Figure 1 depicts a schematic representation of the overall disclosed system 10, which includes, among other aspects, electric motor powered blower 15, two-position rotary valve 100, and air mattress supply lines 302A–D and 302S for supplying air to air mattress 400. Ex. 1305, 2:43–48. In the annotated version of Figure 1 of Wu here, Petitioner added (1) a text box identifying element 15 as a “Blower,” (2) a text box identifying element 100 as a “Rotary valve,” and (3) a gray dotted outline and text box identifying a “Housing.” Pet. 73.

Petitioner states that “[i]ncorporating Wu’s teachings of a rotary valve 100 (a directional control valve), along with blower 15 . . . , into Parienti’s pump device would have allowed for th[e] conversion” of “Parienti’s Reversible Pump Assembly into a Uni-directional Pump Assembly in view

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of Wu’s teachings.” Pet. 72 (citing Ex. 1302 ¶¶ 126, 269), 71. Petitioner explains that “[i]n the [proposed] conversion, Parienti’s housing (as described [in pages 69–71 of the Petition]) would surround Wu’s blower 15 and rotary valve 100, as represented by gray dashed lines in Wu’s Figure 1, above.” *Id.* at 73 (citing Ex. 1302 ¶ 269). Petitioner provides various reasons why, “[i]n converting Parienti into a Uni-directional Pump Assembly in view of Wu, a POSA would have retained Parienti’s housing-contained design (as described in [pages 71–84 of the Petition]), such that Wu’s rotary valve 100 (which includes gate member 200) and blower 15 were disposed in Parienti’s housing.” Pet. 76–78 (citing Ex. 1302 ¶¶ 272–276).

*(2) The Parties’ Positions as to the “Built Into”
Limitation*

With that background, we turn now to the parties’ positions as to the “built into” limitation in the context of this asserted ground. Petitioner states that it relies on Parienti for the “built into” limitation and the “interior region” limitation. Pet. 69 (citing Ex. 1302 ¶ 263). Petitioner states that the “Housing” identified by Petitioner in the same annotated version of Figure 4 of Parienti provided above (*see supra* p. 20)¹⁹ “is built into mattress 5 (the inflatable body), as it is ‘made interdependent with the mattress [5] by means of gluing or any other means.’” Pet. 70 (quoting Ex. 1308, 1:24–25); *see also* Pet. 71 (providing the same annotated version of Figure 1 of Parienti shown *supra* p. 23). Petitioner asserts that “Parienti described the benefit of this built in design as eliminating the ‘need to get an air pump’

¹⁹ Compare Pet. 70, with *id.* at 38 (providing the same annotated version of Figure 4 shown *supra* p. 20).

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separate from the inflatable mattress.” *Id.* (quoting Ex. 1308, 1:25–20; citing Ex. 1302 ¶ 266).

Patent Owner responds that, even if combined, Parienti as modified by Wu does not satisfy the “built into” limitation. PO Resp. 67. On this issue, Patent Owner relies on the arguments it made as to the “built into” limitation in the context of the asserted ground of Parienti and Renz. *Id.* (“Patent Owner respectfully submits that the reasons why Parienti does not teach a housing ‘built into the inflatable body’ of Section VI.A.4 also apply to the combination of Parienti and Wu.”).

Petitioner does not address the “built into” limitation in the context of the discussion of this asserted ground in the Reply. *See* Pet. Reply 13–21. Patent Owner does not address this limitation in the context of the discussion of this asserted ground in the Sur-reply. *See* PO Sur-reply 13–20.²⁰

(3) *Analysis*

Given the similarity of the parties’ positions and arguments as to the “built into” limitation in the context of the asserted ground of Parienti and Wu and the prior asserted ground of Parienti and Renz, for the same reasons discussed above (*see supra* § II.C.3.a.3–5), Petitioner has not shown by a preponderance of the evidence that Parienti satisfies the “built into” limitation. Thus, we determine, based on the complete record, that

²⁰ Although neither Petitioner nor Patent Owner, in discussing the asserted ground of Parienti and Wu in the Reply and Sur-reply, respectively, expressly reference their arguments as to the “built into” limitation from the discussion of the prior asserted ground, we assume that both Petitioner and Patent Owner intended to rely on their prior arguments on this issue. *See* Pet. Reply 1–4 (addressing the “built into” limitation in a discussion of the asserted ground of Parienti and Renz); PO Sur-reply 1–4 (same).

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Petitioner has not demonstrated by a preponderance of the evidence that claim 1 would have been obvious based on Parienti and Wu.

b. Dependent Claims 2–12

Claims 2–12 depend from claim 1. *See* Ex. 1301, 8:40–9:9. For the reasons discussed above as to claim 1 in the context of this asserted ground, we determine, based on the complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claims 2–12 would have been obvious based on Parienti and Wu.

c. Claims 16–23

For independent claim 16 and claims 17–23, which depend from claim 16, Petitioner reference their positions with respect to claims 1–9, 11, and 12. *See* Pet. 92–93. For the reasons discussed above as to claim 1 in the context of this asserted ground, we determine, based on the complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claims 16–23 would have been obvious based on Parienti and Wu.

E. Motions to Exclude Evidence

1. Petitioner’s Motion to Exclude Evidence

Petitioner filed a motion to exclude Exhibits 2030–2033, 2335, 2341, 2342, 2343, 2345, and 2755, which Petitioner contends are not cited in the Patent Owner Response, Sur-reply, or any expert declaration. Paper 102, at 1. Petitioner seeks to exclude this evidence (the “Uncited Exhibits”) as irrelevant under Federal Rules of Evidence Rules 401 and 402. *Id.* Petitioner also argues that certain paragraphs in Exhibit 2329 (Dr. Stevick’s declaration) and Exhibit 2638 (Dr. Becker’s declaration) (collectively, the “Declaration Portions”) should be excluded. *Id.* at 3–7.

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a. Uncited Exhibits

With respect to the Uncited Exhibits, Petitioner argues that prior Board decisions provide that exhibits not cited in a patent owner's papers should be excluded. Paper 102, 1–3.

In opposition, Patent Owner argues that some of the Uncited Exhibits are exhibits to depositions. Paper 104, 4–6. Specifically, Patent Owner argues that Exhibits 2030–2033 are exhibits to Dr. Beaman's deposition testimony (Exhibits 2040 and 2753). *Id.* at 4–6. Patent Owner adds that Petitioner did not properly object, as it did not object to the evidence during the depositions. *Id.* at 5.²¹ In addition, Patent Owner argues that Exhibits 2335, 2345, and 2755 are, in fact, cited in Patent Owner's briefing. *Id.* at 1.

Petitioner replies that Patent Owner addresses only a subset of the exhibits covered in Petitioner's motion. Paper 110, 1 n.1 (identifying Exhibits 2341, 2342, and 2343 as uncontested by Patent Owner). As to the contested exhibits, Petitioner argues that Patent Owner does not identify where in its papers it relies on Dr. Beaman's testimony directed to any of the exhibits challenged by the motion. *Id.* at 3–4. Petitioner maintains that Patent Owner's argument that Petitioner failed to object at the deposition is nonsensical. *Id.* at 4. Petitioner argues that it could not have known at the time of the deposition that Patent Owner would not rely on those exhibits in its later-filed papers. *Id.*

As to Exhibits 2335, 2345, and 2755, we deny Petitioner's motion. We are persuaded by Patent Owner's argument, which is supported by the

²¹ Patent Owner does indicate that Exhibit 2030 was objected to at the deposition, but on the basis that it was derived from a different proceeding. Paper 104, 5.

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record, that these Exhibits *were* cited in at least one of Patent Owner’s Response or Sur-reply. Paper 104, 1.

As to Exhibits 2341, 2342, and 2343, which are not contested by Patent Owner, we deny Petitioner’s motion as moot, as we do not rely on them in this Decision. *See* Trial Practice Guide Update, 17 (“In the Board’s experience, consideration of the objected-to evidence is often unnecessary to resolve the patentability of the challenged claims, and the motion to exclude is moot.”). As to Exhibits 2030–2033, we also deny Petitioner’s motion as moot, as we do not rely on them in this Decision, and also do not rely on Dr. Beaman’s depositions (Ex. 2040 and Ex. 2753). *See* Trial Practice Guide Update, 17.

b. Declaration Portions

With respect to the Declaration Portions, Petitioner argues that this evidence represents arguments that are improperly incorporated by reference by Patent Owner. Paper 102, 3–7.

Patent Owner argues that a motion to exclude evidence is not the proper vehicle to address incorporation by reference. Paper 104, 6–7. Patent Owner explains that we ruled on a motion to strike directed to the Declaration Portions. *Id.*; *see* Paper 73 (Order denying Petitioner’s motion to strike portions of the Patent Owner Response). Patent Owner also argues that Petitioner has not met its burden in seeking exclusion of the Declaration Portions. Paper 104, 7–9. Finally, Patent Owner argues that it did not improperly incorporate arguments from its experts’ declarations. *Id.* at 9–13. In reply, Petitioner reiterates that the Declaration Portions were improperly incorporated by reference into the Patent Owner Response. Paper 110, 4–5.

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We deny Petitioner’s motion to exclude the Declaration Portions. Motions to exclude evidence are used to exclude evidence that is inadmissible. *See* Trial Practice Guide Update, 16–17. Petitioner does not argue that the Declaration Portions represent *inadmissible* evidence. Paper 102, 3–7; Paper 110, 4–5. Instead, Petitioner argues that the Declaration Portions represent improper *argument*, rather than evidence. *See* Paper 102, 3–7; Paper 110, 4–5. Petitioner fails to provide any basis under the Federal Rules of Evidence as to why the Declaration Portions are inadmissible. *See* Paper 102, 3–7; Paper 110, 4–5; Trial Practice Guide Update, 16 (“A motion to exclude must explain why the evidence is not admissible (e.g., relevance or hearsay).”). Although Petitioner did object to Exhibits 2329 and 2638, the objections were directed to bases under the Federal Rules of Evidence not argued in their motion. *See* Paper 51, 2–3, 19–20. As such, it is unclear on this record why Petitioner contends that the Declaration Portions are inadmissible.

Petitioner appears to use the motion to exclude to reargue their motion to strike, this time trying to exclude the underlying declaration paragraphs, rather than the sections of the Patent Owner Response that allegedly incorporate by reference these paragraphs. *See* Paper 102, 3–7; *see also* Paper 73 (denying Petitioner’s motion to strike). We already addressed Petitioner’s motion to strike and how we would address any arguments improperly incorporated by reference. Paper 73.

2. Patent Owner’s Motion to Exclude Evidence

We now turn to Patent Owner’s motion, in which Patent Owner seeks to exclude the entirety or portions of several exhibits filed by Petitioner and

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also seeks to exclude certain testimony cited by Petitioner. We address each category of information in turn below.

a. Exhibits 1368–1370, and References to These Exhibits in Dr. Beaman’s Declaration

Patent Owner contends that Exhibits 1368–1370, and references to these exhibits in Dr. Beaman’s declaration (Exhibit 1302), should be excluded under Federal Rules of Evidence 402, 403, and 1002. Paper 103, 1–2. According to Patent Owner, Exhibits 1368–1370 are animations that do not accurately or completely represent the evidence underlying the animations. *Id.* at 1.

In opposition to Patent Owner’s motion generally, Petitioner argues that Patent Owner fails to follow the proper rules and procedures, and that we should deny the motion, in its entirety, on that basis. Paper 105, 1–2 (quoting Trial Practice Guide Update, 16). We decline to deny Patent Owner’s motion on this basis. We note that Petitioner’s motion, addressed above, also fails to follow the procedure outlined in the Trial Practice Guide Update. *See* Paper 102.

As to the merits, we deny Patent Owner’s motion as to Exhibits 1368–1370 as moot, as we do not rely on them in this Decision. *See* Trial Practice Guide Update, 17. We also do not rely on any of the paragraphs of Dr. Beaman’s declaration (Ex. 1302) that refer to these exhibits. *See id.*

b. Exhibit 1311

Patent Owner argues that Exhibit 1311 should be excluded under Federal Rule of Evidence 1002 “as not being an original” and under Federal Rule of Evidence 1003 “as not being an admissible duplicate due to it being an inaccurate copy with portions of the document cut off.” Paper 103, 2 (discussing Ex. 1311, 11 (and “odd numbered pages following that”)). We

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deny Patent Owner's motion as to Exhibit 1311 as moot, as we do not rely on it in this Decision. *See* Trial Practice Guide Update, 17.

c. Exhibits 1665–1669

Patent Owner “objects to Exhibits 1665–1669 on the ground that they contain improper attorney argument in violation of the page/word count limits for replies.” Paper 103, 2. Patent Owner argues that these exhibits improperly incorporate attorney argument into Petitioner's Reply. *Id.* at 2–4. These exhibits relate to Petitioner's allegations that Patent Owner improperly incorporates arguments from declarations into its Patent Owner Response. *See id.*

In opposition, Petitioner argues that Patent Owner does not cite any evidentiary basis for excluding these exhibits, and argues that a motion to exclude is not the proper procedure to challenge these exhibits. Paper 105, 5 (discussing Trial Practice Guide Update, 17). Patent Owner replies that, by filing Exhibits 1665–1669, Petitioner exceeded the word count for a Reply. Paper 108, 2–3.

We do not exclude Exhibits 1665–1669 because Patent Owner provides no evidentiary basis as to why these exhibits constitute inadmissible evidence. To the extent that these exhibits do contain attorney argument, the proper remedy in such a situation is for us, when considering Petitioner's Reply arguments and evidence as a whole, to not consider any “arguments” found only in these exhibits and not adequately explained in the Reply. *See* Trial Practice Guide Update, 17–18; *cf.* Paper 73, 5 (addressing Petitioner's motion to strike).

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d. Exhibit 1625

Patent Owner contends that Exhibit 1625, Dr. Beaman’s declaration supporting the Reply, mischaracterizes certain earlier testimony of Patent Owner’s expert and exceeds the proper scope of a reply. Paper 103, 5. According to Patent Owner, Dr. Beaman’s Reply declaration mischaracterizes testimony from Patent Owner’s declarant in support of its Preliminary Response (Dr. William K. Durfee) based on characterizations of the testimony from Petitioner’s counsel. *Id.* at 5–6. Patent Owner also argues that addressing Dr. Durfee’s testimony, which was not relied on in the Patent Owner Response, is outside the scope of a proper reply. *Id.* at 6.

Petitioner responds that Patent Owner does not provide a basis under the Federal Rules of Evidence to exclude Dr. Beaman’s testimony. Paper 105, 8. Petitioner adds that a motion to exclude should not be directed to arguments or evidence that a party believes exceeds the proper scope of a reply. *Id.* at 8–9. According to Petitioner, the testimony sought to be excluded identifies inconsistencies between Patent Owner’s declarants’ testimony. *Id.* at 9.

In reply, Patent Owner argues that Dr. Beaman’s testimony lacks proper foundation. Paper 108, 3–4.

We do not exclude this evidence. Patent Owner did not rely on a lack of foundation in its objection to Dr. Beaman’s testimony or in its opening brief on its Motion to Exclude. *See* Paper 80, 5 (“Team Worldwide objects to the Reply Declaration of Joseph J. Beaman, Jr. (Exhibit 1625), which mischaracterizes Exhibit 2301 and/or exceeds the proper scope of reply.”); Paper 103, 5–6 (contending that Exhibit 1625 “mischaracterizes Patent Owner’s early expert testimonial evidence (Exhibit 2301) and/or exceeds the

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proper scope of reply”). Accordingly, Patent Owner does not identify an evidentiary basis to exclude the evidence. Also, neither Patent Owner’s motion to exclude nor its objection identifies, with particularity, those portions of Dr. Beaman’s Reply declaration to be excluded, as Patent Owner’s citations were presented as exemplary only. *See* Paper 80, 5 (“See, for example, Exhibit 1625 at ¶¶ 7, 8, 14, 15, 20, 63, 108, and 113.”); Paper 103, 5 (same), 6 (same).

e. Exhibit 1650

Patent Owner states to have “objected to the Declaration of Ryan Slate in Support of Petitioner[’s] Reply (Ex. 1650) on the basis that as of the discussions between the Parties conducted to date Patent Owner was not afforded a proper opportunity to cross-examine Mr. Slate.” Paper 103, 6. Patent Owner does not address this evidence in reply to Petitioner’s contention that this objection should be withdrawn. *See* Paper 105, 10; Paper 108. To the extent Patent Owner’s motion as to this exhibit was not withdrawn, we deny it as moot, as we do not rely on Exhibit 1650 in this Decision. *See* Trial Practice Guide Update, 17.

f. Exhibits 1651–1654 and 1679

Patent Owner contends that Exhibits 1651–1654 and 1679 include hearsay, are irrelevant, are unfairly prejudicial, and lack foundation. Paper 103, 7. We deny Patent Owner’s motion as to these exhibits as moot, as we do not rely on them in this Decision. *See* Trial Practice Guide Update, 17.

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III. CONCLUSION

Upon consideration of the Petition, Response, Reply, Sur-reply and the evidence of record, we determine that Petitioner (1) has *not* proven by a preponderance of the evidence that claims 1–12 and 16–23 of the '394 patent would have been obvious based on Parienti and Renz, and (2) has *not* proven by a preponderance of the evidence that claims 1–12 and 16–23 of the '394 patent would have been obvious based on Parienti and Wu.

IV. ORDER

For the reasons above, it is:

ORDERED that Petitioner has not proven by a preponderance of the evidence that any of claims 1–12 and 16–23 is unpatentable;

FURTHER ORDERED that Petitioner's and Patent Owner's Motions to Exclude Evidence (Papers 102, 103) are denied; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

In summary:

Claims	35 U.S.C. §	References	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–12, 16–23	103	Parienti and Renz		1–12, 16–23
1–12, 16–23	103	Parienti and Wu		1–12, 16–23
Overall Outcome				1–12, 16–23

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Paper 130
Date: October 25, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEX RECREATION CORPORATION and
BESTWAY (USA) INC.,
Petitioner,

v.

TEAM WORLDWIDE CORPORATION,
Patent Owner

IPR2018-00874
Patent 7,246,394 B2

Before BEVERLY M. BUNTING, JAMES J. MAYBERRY, and
ERIC C. JESCHKE, *Administrative Patent Judges*.

JESCHKE, *Administrative Patent Judge*.

NOTICE

Notice of Disposition of Sealed Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

APPX000404

IPR2018-00874
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Today, we issued a non-public version of a Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. Paper 129. For the reasons discussed in the Final Written Decision (a public version of which will issue in due course), we concluded that Petitioner has proven by a preponderance of the evidence that claims 1–12 and 16–23 of U.S. Patent No. 7,246,394 B2 are unpatentable.

The following table summarizes the determinations in this proceeding.

Claims	35 U.S.C. §	References	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–12, 16–23	103	Chaffee ¹ and Wu ²	1–12, 16–23	
1–12, 16–23	103	Chaffee, Scott ³ , and Pisante ⁴	1–12, 16–23	
Overall Outcome			1–12, 16–23	

¹ US 7,039,972 B2, issued May 9, 2006 (Ex. 1406, “Chaffee”).

² US 6,698,046 B1, issued Mar. 2, 2004 (Ex. 1405, “Wu”).

³ US 4,938,528, issued July 3, 1990 (Ex. 1421, “Scott”).

⁴ FR 2583825 (and certified translation), published Dec. 26, 1986 (Ex. 1472, “Pisante”).

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NONCONFIDENTIAL - PROTECTIVE ORDER MATERIAL HAS BEEN REDACTED

NON-PUBLIC VERSION – PROTECTIVE ORDER MATERIAL

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Paper 129
Date: October 25, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEX RECREATION CORPORATION and
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Before BEVERLY M. BUNTING, JAMES J. MAYBERRY, and
ERIC C. JESCHKE, *Administrative Patent Judges*.

JESCHKE, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

ORDER
Denying Petitioner's Motion to Exclude
Denying Patent Owner's Motion to Exclude
37 C.F.R. § 42.64

NON-PUBLIC VERSION – PROTECTIVE ORDER MATERIAL

APPX000407

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Patent 7,246,394 B2

Intex Recreation Corporation and Bestway (USA) Inc. (collectively, “Petitioner”)¹ challenges the patentability of claims 1–12 and 16–23 (“the Challenged Claims”) of U.S. Patent No. 7,246,394 B2 (Ex. 1401, “the ’394 patent”), which is assigned to Team Worldwide Corporation (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6, and we issue this Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons below, we conclude that Petitioner has proven by a preponderance of the evidence that claims 1–12 and 16–23 of the ’394 patent are unpatentable.

I. BACKGROUND

A. *Procedural History*

Petitioner filed a Petition seeking *inter partes* review of the Challenged Claims. Paper 1 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 8. We instituted a trial as to all the Challenged Claims. Paper 14 (“Decision on Institution” or “Dec. Inst.”).

During the trial, Patent Owner filed a Response (Paper 46, “PO Resp.”), Petitioner filed a Reply (Paper 73, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 80, “PO Sur-reply”).² Petitioner and Patent Owner also filed Motions to exclude evidence (Papers 98 and 99, respectively), Oppositions to the Motions (Papers 100 and 101, respectively), and Replies to the Oppositions (Papers 105 and 104, respectively).

¹ Walmart Inc., Wal-Mart Stores Texas, LLC, Wal-Mart.com USA LLC, and Sam’s West, Inc. d/b/a Sam’s Club (“the Walmart Entities”) were originally named as petitioners (Paper 1, 1); however, this proceeding was terminated with respect to the Walmart Entities during trial (Paper 96).

² Paper 47 is a public version of the Patent Owner Response. Paper 74 is a public version of the Petitioner’s Reply. Paper 81 is a public version of the Patent Owner Sur-reply.

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Petitioner relies on the declaration testimony of Dr. Joseph J. Beaman, Jr. (Exs. 1402 and 1625) and Mr. W. Todd Schoettelkotte (Ex. 1649). Patent Owner relies on the declaration testimony of Dr. Glen Stevick (Ex. 2429) and Dr. Stephen L. Becker (Ex. 2638). Oral argument was held on July 29, 2019, and a copy of the transcript of that argument was entered into the record. Paper 117 (public); Paper 118 (confidential) (“Tr.”).

B. Related Proceedings

The parties identify a prior proceeding in the U.S. District Court for the Eastern District of Texas (“the Texas District Court”) involving the ’394 patent: *Team Worldwide Corp. v. Walmart Inc. et al.*, No. 2:17-cv-00235-JRG (E.D. Tex.), filed March 29, 2017 (“the Texas Litigation”). Pet. 1–2; PO Resp. 1; Paper 90, 1; Paper 120, 2. The Texas District Court issued a claim construction order on March 15, 2018. Ex. 1475. On November 20, 2018, the Texas District Court dismissed the Texas Litigation with prejudice. Ex. 1680.

The Texas Litigation also involved U.S. Patent No. 9,211,018 B2 (“the ’018 patent”) and U.S. Patent No. 7,346,950 B2 (“the ’950 patent”). Pet. 2; PO Resp. 1. Petitioner filed four additional petitions for *inter partes* review of claims 1–12 and 16–23 of the ’394 patent in IPR2018-00870, IPR2018-00871, IPR2018-00872, and IPR2018-00873. Petitioner also filed petitions for *inter partes* review of (1) claims 1, 5, 7, and 11–14 of the ’018 patent, in IPR2018-00859, and (2) claims 1, 7, and 11–14 of the ’950 patent, in IPR2018-00875.

The parties also identify the following proceedings in the Texas District Court involving the ’394 patent, the ’018 patent, and the ’950 patent:

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- (1) *Team Worldwide Corp. v. Macy's, Inc. and Macys.com, LLC*, No. 2:19-cv-00099-JRG (E.D. Tex.);
- (2) *Team Worldwide Corp. v. Target Corp. and Target Brands, Inc.*, No. 2:19-cv-00100-JRG (E.D. Tex.);
- (3) *Team Worldwide Corp. v. The Home Depot, Inc.*, No. 2:19-cv-00098-JRG (E.D. Tex.);
- (4) *Team Worldwide Corp. v. Dick's Sporting Goods, Inc.*, No. 2:19-cv-00097-JRG (E.D. Tex.);
- (5) *Team Worldwide Corp. v. Costco Wholesale Corp.*, No. 2:19-cv-00096-JRG (E.D. Tex.);
- (6) *Team Worldwide Corp. v. Bed Bath & Beyond, Inc.*, No. 2:19-cv-00095-JRG (E.D. Tex.);
- (7) *Team Worldwide Corp. v. Amazon.com, Inc. and Amazon.com LLC*, No. 2:19-cv-00094-JRG (E.D. Tex.);
- (8) *Team Worldwide Corp. v. Ace Hardware Corp.*, No. 2:19-cv-00093-JRG (E.D. Tex.); and
- (9) *Team Worldwide Corp. v. Academy, Ltd. d/b/a Academy Sports + Outdoors*, No. 2:19-cv-00092-JRG (E.D. Tex.).

Paper 90, 2–3; Paper 120, 4–5. According to Patent Owner, these nine proceedings are stayed pending the outcomes of IPR2018-00859 and IPR2018-00870 through -00875. Paper 90, 3.

Patent Owner also states it “filed a claim in *In re Sears Holding Corporation, et al.* chapter 11 bankruptcy cases pending before the United States Bankruptcy Court for the Southern District of New York, Case No. 18-23538 (RDD) (Jointly Administered) in which Patent Owner asserts infringement” of the ’394 patent, the ’018 patent, and the ’950 patent. Paper 90, 3.

C. The ’394 Patent

The ’394 patent, titled “Inflatable Product with Built-in Housing and Switching Pipe,” issued on July 24, 2007. Ex. 1401, codes (54), (45). It “relates in general to an inflatable product provided with an electric air

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pump.” *Id.* at 1:14–15. According to the ’394 patent, prior air mattresses included inflatable chambers that “are inflated by an electric air pump . . . , which is separately provided, requiring users to carry two items, the air mattress itself, and an electric air pump” such that “[i]nconvenience results, especially for outdoor use.” *Id.* at 1:17–24. The ’394 patent, in contrast, “provides a modified air mattress, which has a built-in electric air pump eliminating the need for an external pump.” *Id.* at 1:25–27.

Figure 1A is reproduced below:

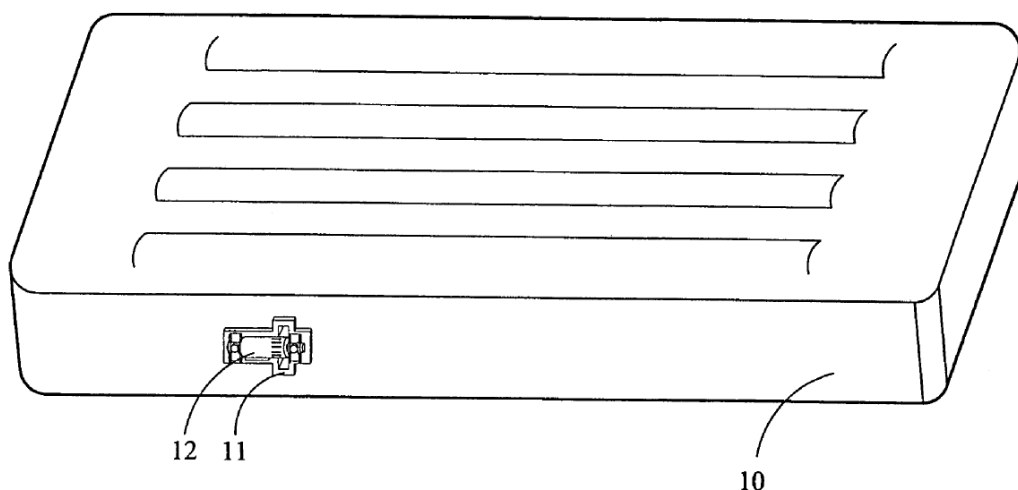


FIG. 1A

Figure 1A depicts “a perspective diagram of an inflatable product,” which includes inflatable chamber 10, pump seat 11, and air pump 12.

Ex. 1401, 1:50–51, 3:15–21.

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Figures 3A and 3B are reproduced below:

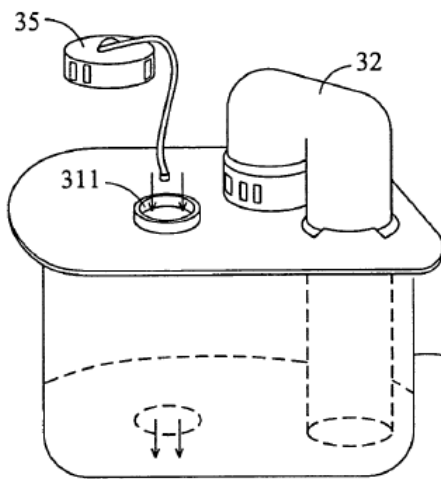


FIG. 3A

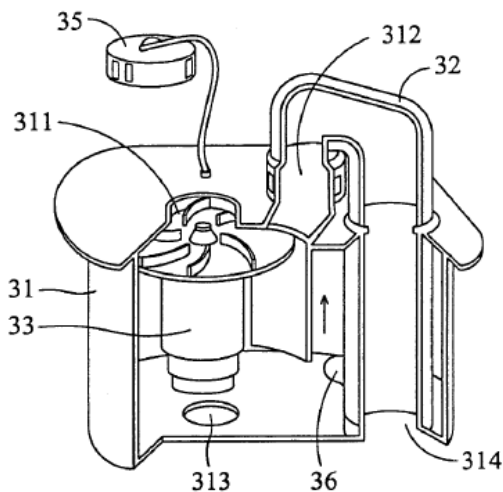


FIG. 3B

Figure 3A depicts an air pump of an embodiment of an inflatable product (as shown, for example, in Figure 1A) during inflation. Ex. 1401, 1:66–67. Figure 3B depicts the air pump of Figure 3A with portions of certain structures removed. *Id.* at 2:1–2. Figures 3A and 3B show, among other aspects, housing 31, fan and motor 33, switching pipe 32, flap 36, and cover 35. *Id.* at 4:13–16. For inflation, “the switching pipe 32 is connected to the air outlet 312 on the top surface of the housing 31” and “cover 35 is removed from the air intake 311.” *Id.* at 4:22–25.³ In this configuration, “[t]he inflatable product (not shown) is inflated by the fan and motor 33” as “[a]ir flows through the air intake 311 and the air outlet 313, and into the inflatable product.” *Id.* at 4:25–28.

³ Throughout this Decision, we omit any bolding of reference numerals in quotations from the '394 patent and from prior art references.

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Figures 3C and 3D are reproduced below:

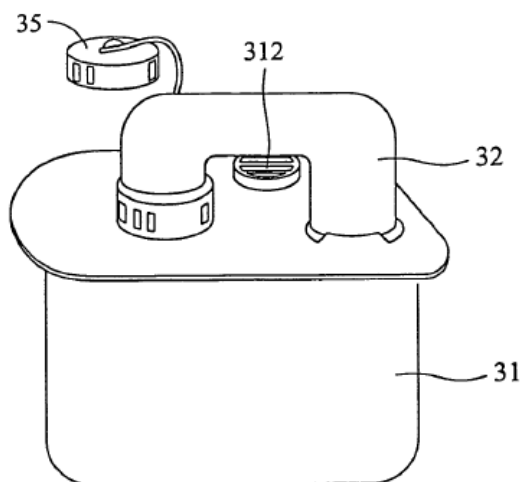


FIG. 3C

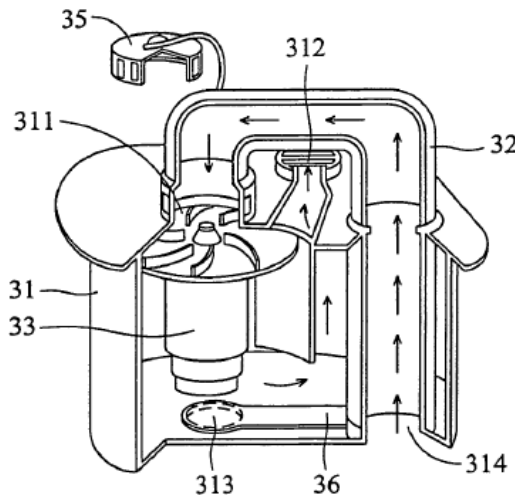


FIG. 3D

Figure 3C depicts an air pump of an embodiment of an inflatable product during deflation. Ex. 1401, 2:3–4. Figure 3D depicts the air pump of Figure 3C with portions of certain structures removed. *Id.* at 2:5–6. For deflation, “the switching pipe 32 is switched from the air outlet 312 to the air intake 311 on the top surface of the housing 31” and “the flap 36 follows the switching pipe 32 to rotate to close the air outlet 313 on the bottom surface of the housing 31.” *Id.* at 4:29–33. In this configuration, “air in the inflatable product is evacuated by the fan and motor 33” along the path indicated by arrows such that “[a]ir flows through the air intake 314, the switching pipe 32 and the air intake 311, and into the housing 31” and “out from the air outlet 312.” *Id.* at 4:33–38.

D. Illustrative Claims

Of the Challenged Claims, claims 1 and 16 are independent. Claims 2–12 depend from claim 1, and claims 17–23 depend from claim 16.

Claim 1 is reproduced below:

1. An inflatable product including:

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an inflatable body;
a fan and motor assembly for pumping air;
a housing built into the inflatable body, the housing having an interior region; and
an air conduit disposed at least in part in the housing, the air conduit being movable between a first position and a second position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;
wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.

Ex. 1401, 8:24–38.

Claim 16 is reproduced below:

16. An inflatable product including:
an inflatable body;
a fan and motor assembly for pumping air;
a housing built into the inflatable body, the housing having an interior region; and
an air conduit having a first end and a second end, the air conduit disposed at least in part in the housing and arranged to convey air pumped by the fan and motor assembly, the air conduit being movable between a first position and a second position, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;
wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation, and

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wherein the fan and motor assembly causes air to be conveyed from the first end of the air conduit to the second end of the air conduit when the air conduit is in the first position, and the fan and motor assembly causes air to be conveyed in sequence from the inflatable body, through the second end of the air conduit, to the first end of the air conduit, to ambient when the air conduit is in the second position.

Ex. 1401, 9:38–10:19.

E. Instituted Grounds of Unpatentability

We instituted *inter partes* review of the Challenged Claims based on the following grounds of unpatentability asserted by Petitioner:

Claims Challenged	35 U.S.C. §	References
1–12, 16–23	103	Chaffee ⁴ and Wu ⁵
1–12, 16–23	103	Chaffee, Scott ⁶ , and Pisante ⁷

II. DISCUSSION

A. The Level of Ordinary Skill in the Art

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). In the Decision on Institution, we adopted Patent Owner’s formulation of the level of ordinary skill in the art: one of ordinary skill in the art would have had either (1) a bachelor’s degree in

⁴ US 7,039,972 B2, issued May 9, 2006 (Ex. 1406, “Chaffee”).

⁵ US 6,698,046 B1, issued Mar. 2, 2004 (Ex. 1405, “Wu”).

⁶ US 4,938,528, issued July 3, 1990 (Ex. 1412, “Scott”).

⁷ FR 2583825 (and certified translation), published Dec. 26, 1986 (Ex. 1472, “Pisante”).

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mechanical engineering or an equivalent field or (2) at least two years of experience in mechanical and electrical design aspects of inflatable products having electric air pumps. Dec. Inst. 15–16.

Following institution, neither Petitioner nor Patent Owner objected to this determination. *See* PO Resp. 20 (repeating the same formulation as stated prior to institution); *see also* Dec. Inst. 16 n.6 (discussing why we did not discern any special meaning for the term “designer” in Patent Owner’s formulation of the level of skill in the art for an individual without a bachelor’s degree in mechanical engineering). For the same reasons provided in the Decision on Institution (Dec. Inst. 15–16), we maintain this determination of the level of ordinary skill in the art for purposes of this Final Written Decision. Further, the patentability and claim construction analyses below would reach the same findings and determinations under either party’s definition of the level of ordinary skill in the art.

B. Claim Construction

In an *inter partes* review based on a petition filed prior to November 13, 2018, claim terms in an unexpired patent, such as the ’394 patent, are given their broadest reasonable construction in light of the specification.⁸ *See* 37 C.F.R. § 42.100(b) (2017); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard as the claim construction standard to be applied in an

⁸ Patent Owner’s contentions regarding the applicability of the district-court-type claim construction standard are inapposite because the present Petition was filed prior to the rule change effective November 13, 2018. *See* PO Resp. 11–12, 11 n.2. Although the applicable version of Rule 42.100(b) permitted a party to request that the Board apply the district-court-type claim construction standard, Patent Owner did not provide either the required certification or the required request. *See* 37 C.F.R. § 42.100(b).

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inter partes review); *see also* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018). Under the broadest reasonable construction standard, claim terms are generally given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Petitioner proposes constructions for the terms “fan” (Pet. 23–24), “inflatable body” (*id.* at 24–26), and “pipe” (*id.* at 26–27). Patent Owner proposes constructions for the terms “built into” (PO Resp. 12–14), “inflatable body” (*id.* at 14–18), “pipe” (*id.* at 18–19), and “fan” (*id.* at 19–20). We determined in our Decision on Institution that express construction of only the term “built into” was necessary. Dec. Inst. 16–20.

Based on the full record developed at trial, we maintain that view for purposes of this Final Written Decision, as the determination as to the alleged obviousness of the Challenged Claims does not turn on the express interpretation of any of the remaining claim terms. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (stating that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). We discuss the term “built into” below.

Independent claims 1 and 16 each recite “a housing *built into* the inflatable body.” Ex. 1401, 8:27, 9:41 (emphasis added). In the Decision on Institution, we preliminarily construed “built into” in accordance with its

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plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” Dec. Inst. 20.

Patent Owner agrees with this construction. *See* PO Resp. 14 (stating that “‘built into’ should be construed as ‘integrated into and not detachable from’”), 12 (stating that the preliminary construction “matches Patent Owner’s proposed definition”). Petitioner did not address this claim term in the claim construction section of the Petition or in the Reply. *See* Pet. 23–27; *see generally* Pet. Reply. Here, the parties agree on the construction of “built into,” but do not agree on the application of that construction to the asserted prior art. *See* Tr. 9:17–19 (counsel for Petitioner stating that “there’s no dispute about [the construction of ‘built into’] between the parties”), 56:19–21 (counsel for Patent Owner stating that “everybody seems to agree” on the construction of “built into”). We address the disagreements as to the *application* of this construction to the prior art in the discussion of the asserted grounds below.

Based on the complete record, for the reasons provided in the Decision on Institution, we maintain our construction of “built into” in accordance with its plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” *See* Dec. Inst. 17–20.

C. Asserted Obviousness of Claims 1–12 and 16–23 Based on Chaffee and Wu

Petitioner asserts that claims 1–12 and 16–23 of the ’394 patent are unpatentable under 35 U.S.C. § 103(a) based on Chaffee and Wu. Pet. 23, 31–66; Pet. Reply 6–23. Patent Owner provides arguments specifically addressing this asserted ground of unpatentability. PO Resp. 21–58; PO

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Sur-reply 2–19. We begin our analysis with an overview of the asserted prior art and then address the parties’ specific contentions.

1. Chaffee

Chaffee relates to “inflatable devices, and, more specifically, to an inflatable device with a recessed fluid controller.” Ex. 1406, 1:13–15.

Figure 2 of Chaffee is reproduced below:

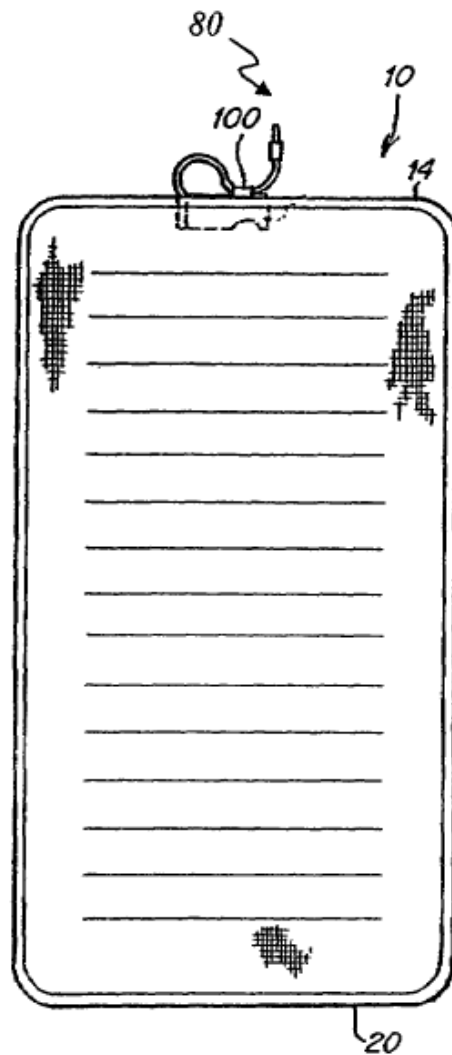


Fig. 2

Figure 2 depicts inflatable device 10, which includes, among other aspects, “substantially fluid impermeable bladder 20 and a fluid controller

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80 comprising an electrically powered pump at least partly positioned within bladder 20.” Ex. 1406, 3:3–7. Chaffee discloses that fluid controller 80 “control[s] the flow of fluid into and/or out of bladder 20.” *Id.* at 3:59–61.

Figures 3 and 5 are reproduced below:

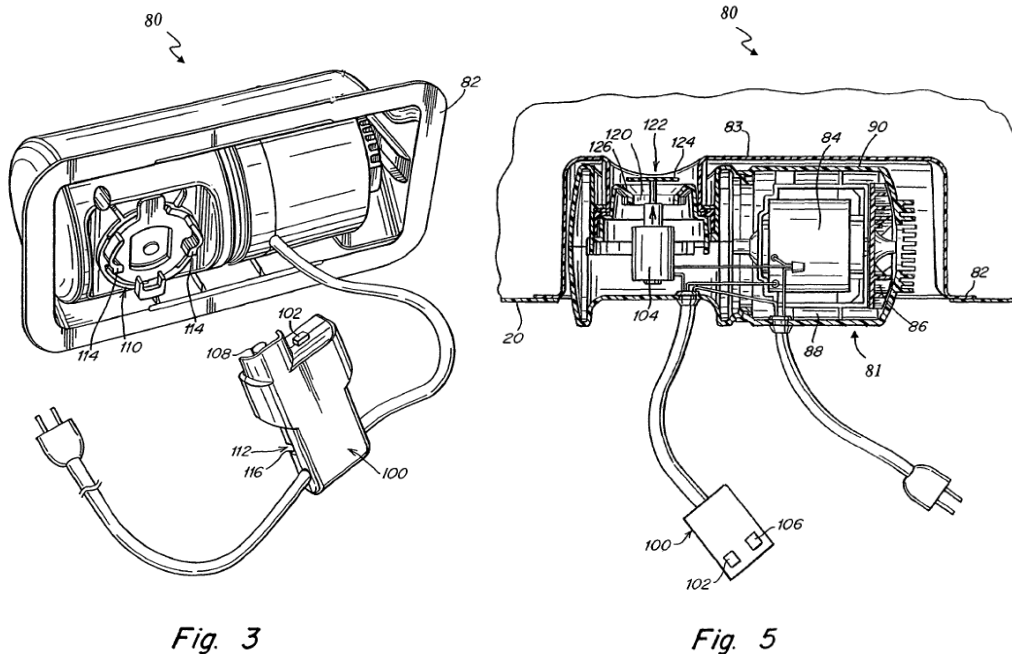


Fig. 3

Fig. 5

Figures 3 and 5 depict a perspective view and cross-sectional view, respectively, of one embodiment of fluid controller 80. Ex. 1406, 2:34–35, 2:38–39. These figures depict, among other aspects, pump 81, flange 82, wall 83, and housing 90. *See id.* at 4:11–17, 5:4–13.

2. Wu

Wu is generally directed to a system for controlling air flow into chambers of an air mattress. Ex. 1405, 1:12–14.

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Figure 1 of Wu is reproduced below:

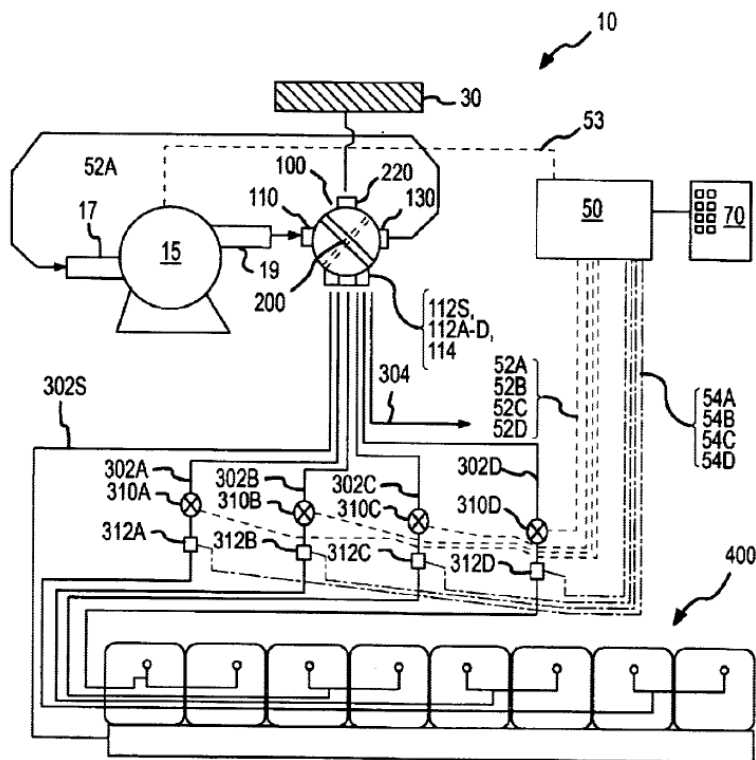
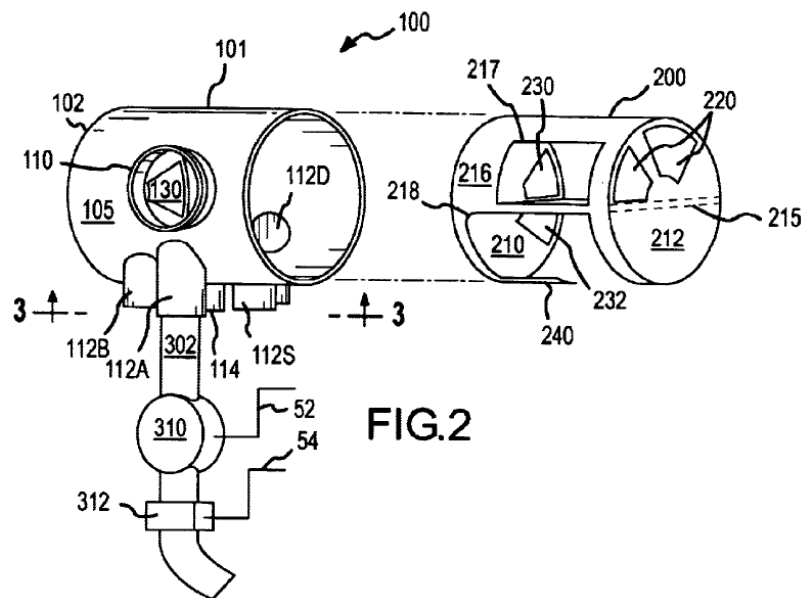


FIG.1

Figure 1 depicts a schematic representation of the overall disclosed system 10, which includes, among other aspects, electric motor powered blower 15, two-position rotary valve 100, and air mattress supply lines 302A–D and 302S for supplying air to air mattress 400. Ex. 1405, 2:43–48. Included in rotary valve 100 is gate member 200, which is shown in Figure 1 “in a first position for directing air flow in a pressurizing mode.” *Id.* at 3:3–8. Wu discloses that “[w]hen gate member 200 is in the first position, air can flow through inlet port 110 of housing 101, into the second portion of gate member 200 and then out through air mattress supply ports 112S, 112A, 112B, 112C and 112D and exhaust port 114.” *Id.* at 5:56–60.

Figure 2 is reproduced below:



Gate member 200 fits within valve housing 101 and includes two end walls that close gate member 200 within valve housing 101. Ex. 1405, 5:9–19. Horizontal wall 215 divides gate member 200 into two sections. *Id.* at 5:19–22. The port arrangement in gate member 200 and valve housing 101

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allows the valve to operate in a first position that allows air to be delivered to air mattress 400 and a second position that allows air mattress 400 to be deflated. *Id.* at 5:44–48.

3. *Analysis*

a. *Independent Claim 1*

Petitioner contends that the proposed combination of Chaffee and Wu satisfies each of the limitations of claim 1. Pet. 32–58. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage with respect to the corresponding claim limitation. *Id.* Petitioner also identifies reasons why one of ordinary skill in the art at the time of the invention would have been motivated to modify Chaffee based on Wu. *Id.* at 38, 43–56. We address in turn below the subject matter of each limitation in claim 1, then Petitioner’s identified reasons to modify Chaffee based on Wu, and then objective evidence of nonobviousness.

(1) *The “Inflatable Body” Limitation*

Claim 1 recites “an inflatable body.”⁹ Ex. 1401, 8:25 (“the ‘inflatable body’ limitation”). Referencing Figure 2 of Chaffee, Petitioner states that Chaffee discloses “an inflatable device 10 including ‘a substantially fluid impermeable bladder 20’ . . . that can be ‘inflate[d] and/or deflate[d]’ by a fluid controller 80 with a pump 81.” Pet. 32 (citing Ex. 1406, 3:5, 3:8–10, 3:32–42, 3:64; 4:23–26; Ex. 1402 ¶ 180). According to Petitioner, “[u]nder

⁹ Petitioner takes the position that the “preamble [in claim 1] is not a limitation.” Pet. 32 n.4. We agree; here, the body of the claim “sets out the complete invention” such that “the language of the preamble is superfluous.” *Schumer v. Lab. Comput. Sys., Inc.*, 308 F.3d 1304, 1310 (Fed. Cir. 2002). Patent Owner does not dispute Petitioner’s position on this issue.

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any reasonable construction of the term, Chaffee's bladder 20 is an 'inflatable body.'" *Id.* (citing Ex. 1402 ¶ 181).

The record evidence, summarized above, supports Petitioner's position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee discloses the "inflatable body" limitation. Patent Owner does not present arguments for this limitation.

(2) *The "Fan and Motor" Limitation*

Claim 1 recites "a fan and motor assembly for pumping air." Ex. 1401, 8:26 ("the 'fan and motor' limitation"). Petitioner relies on Chaffee as modified by Wu to address this limitation. *See* Pet. 33–38. Petitioner provides the annotated version of Figure 5 of Chaffee below and states that Chaffee discloses "a Reversible Pump Assembly including motor 84 and impeller 86." Pet. 33 (citing Ex. 1402 ¶ 114).

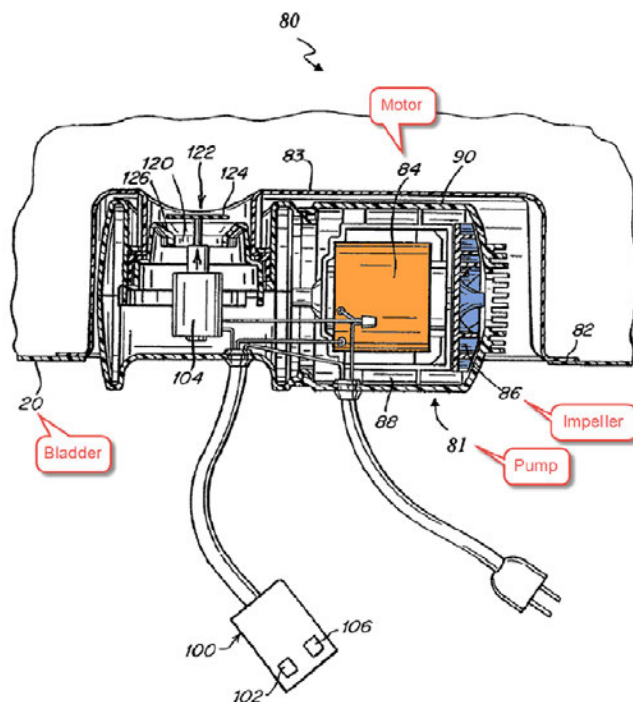


Fig. 5

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Pet. 34. Figure 5 depicts a cross-sectional view of one embodiment of fluid controller 80. *See* Ex. 1406, 2:38–39. In the annotated version of Figure 5, Petitioner added (1) a text box identifying element 84 as a “Motor,” (2) a text box identifying element 86 as an “Impeller,” (3) a text box identifying element 81 as a “Pump,” (4) a text box identifying element 20 as a “Bladder,” (5) an orange overlay to motor 84, and (6) a blue overlay to impeller 86. Pet. 34. Referring to the annotated version of Figure 5 above, Petitioner states that “Chaffee disclose[s] that pump 81 ‘may be a conventional fluid pump including a motor 84 [orange] that drives an impeller 86 [blue] moving air into, or out of, bladder 20’ and that a switch can ‘reverse the direction of the pump to deflate bladder 20.’” Pet. 33 (quoting Ex. 1406, 3:62–67, 6:19–20) (citing Ex. 1402 ¶¶ 114, 182–183).

Petitioner also provides the annotated version of Figure 1 of Wu below, and states that Wu discloses “a Uni-directional Pump Assembly, including blower 15 and rotary valve 100, ‘for supplying air and controlling the flow of air into and out of the chambers of a patient supporting air mattress [400].’” Pet. 37 (quoting Ex. 1405, Abstract, 2:44–47) (citing Ex. 1402 ¶ 12; Ex. 1466, 4:4–6, 15:5–6).

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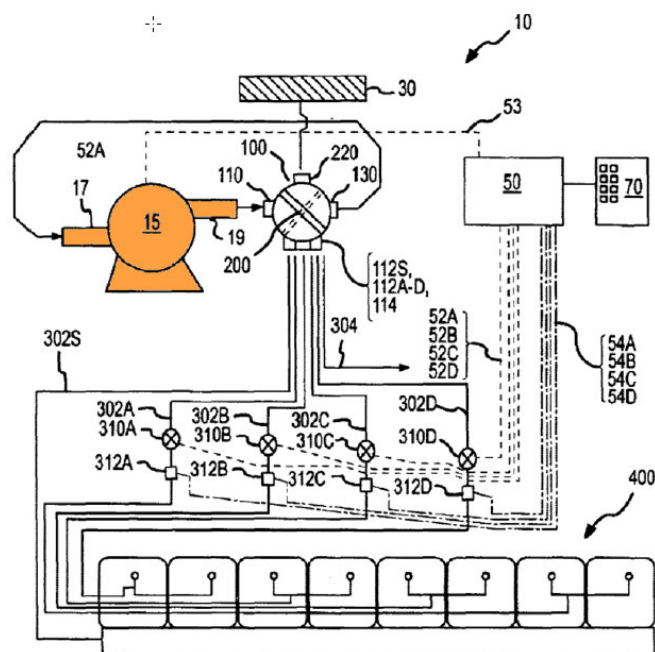


FIG.1

Pet. 37. Figure 1 depicts a schematic representation of the overall disclosed system 10, which includes, among other aspects, electric motor powered blower 15, two-position rotary valve 100, and air mattress supply lines 302A–D and 302S for supplying air to air mattress 400. Ex. 1405, 2:43–48. In the annotated version of Figure 1 of Wu, Petitioner added an orange overlay to electric motor powered blower 15. Pet. 37.

Petitioner states that “Wu’s blower 15 is a fan and motor assembly for pumping air” and that “Wu describe[s] blower 15 as ‘an electric motor powered variable speed blower,’ and ‘a centrifugal fan type blower.’” Pet. 38 (quoting Ex. 1405, Abstract, 2:56–57). According to Petitioner, in Figure 1, blower 15 “is schematically shown as part of system 10, although the electric motor is not shown.” *Id.* (citing Ex. 1405, 2:53–55; Ex. 1402 ¶ 184). According to Petitioner, “in view of Wu’s teaching of a

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Unidirectional Pump Assembly, including motorized blower 15 (a fan and motor) for pumping air, [one of ordinary skill in the art] would have been motivated to use Wu’s teachings of a unidirectional blower 15 in converting Chaffee’s pump 81 into a Uni-directional Pump Assembly,” for reasons we discuss below (*see infra* § II.C.3.a.7). Pet. 38 (citing Ex. 1402 ¶¶ 183–185).

The record evidence, summarized above, supports Petitioner’s position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Wu discloses the subject matter of the “fan and motor” limitation. Patent Owner does not dispute that Chaffee as modified by Wu discloses the subject matter of this limitation.¹⁰

(3) The “Interior Region” Limitation

Claim 1 recites “the housing having an interior region.” Ex. 1401, 8:27–28 (“the ‘interior region’ limitation”). Petitioner argues that Chaffee discloses this limitation. Pet. 38–40. Petitioner identifies flange 82, flange wall 83, and housing 90 in Chaffee, collectively, as a “housing.” *Id.* at 39–40 (citing Ex. 1406, 4:15–17, 4:19–22; Ex. 1402 ¶¶ 187, 192) (“[T]o be clear, flange 82 and flange wall 83 are part of the housing 90 and, collectively, constitute the claimed ‘housing.’ Flange 82, flange wall 83, and housing 90 will be referred to herein, collectively, as ‘Chaffee’s Housing.’” (citation omitted)). Petitioner provides the following annotated version of Figure 5 of Chaffee, with (1) the three identified structural elements making up “Chaffee’s Housing” overlaid in orange and identified

¹⁰ We address below Patent Owner’s arguments that one of ordinary skill in the art would not have modified Chaffee based on Wu as proposed. *See infra* § II.C.3.a.7.

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with text boxes, (2) pump 81 identified with a text box, and (3) an “Interior region” identified:

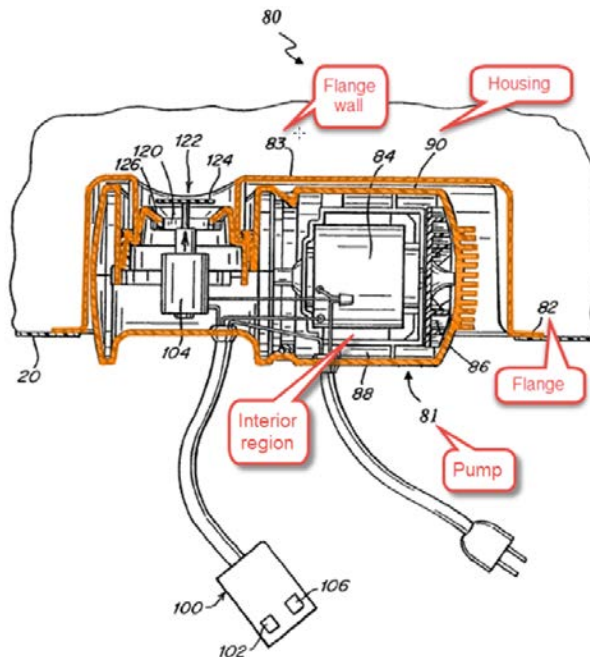


Fig. 5

Pet. 39. Figure 5 of Chaffee depicts “a top, cross-sectional view of one embodiment.” Ex. 1406, 2:38–39. Referring to the annotated version of Figure 5 above, Petitioner states that “Chaffee’s Housing includes an interior region” (Pet. 40 (citing Ex. 1402 ¶ 188; Ex. 1406, 4:15–17, 4:19–22)) and states that “pump 81 includes a ‘housing 90 [orange] that surrounds the inner workings of the pump’” (Pet. 38 (quoting Ex. 1406, 4:18–19) (citing Ex. 1406, 2:55–26; Ex. 1402 ¶ 187)).

The record evidence, summarized above, supports Petitioner’s position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee discloses the “interior region” limitation. Patent Owner does not present arguments for this limitation.

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(4) The “Built Into” Limitation

Claim 1 recites “a housing built into the inflatable body.” Ex. 1401, 8:27 (“the ‘built into’ limitation”). Petitioner state that Chaffee discloses this limitation. *See* Pet. 38 (citing Ex. 1402 ¶ 186), 40–43. As discussed in the prior section (addressing the “interior region” limitation), Petitioner identifies flange 82, flange wall 83, and housing 90 in Chaffee, collectively, as the “housing.” Pet. 39–40 (“[T]o be clear, flange 82 and flange wall 83 are part of the housing 90 and, collectively, constitute the claimed ‘housing.’” (citing Ex. 1406, 4:15–17, 4:19–22; Ex. 1402 ¶¶ 187, 192)), 40 (“Flange 82, flange wall 83, and housing 90 will be referred to herein, collectively, as ‘Chaffee’s Housing.’”). Petitioner identifies bladder 20 in Chaffee as the “inflatable body.” Pet. 40 (“Chaffee’s Housing is built into bladder 20.”), 41 and 43 (citing Ex. 1402 ¶¶ 190, 192, respectively) (both referencing “bladder 20 (the inflatable body)”).

Petitioner provides this annotated version of Figure 5 of Chaffee:

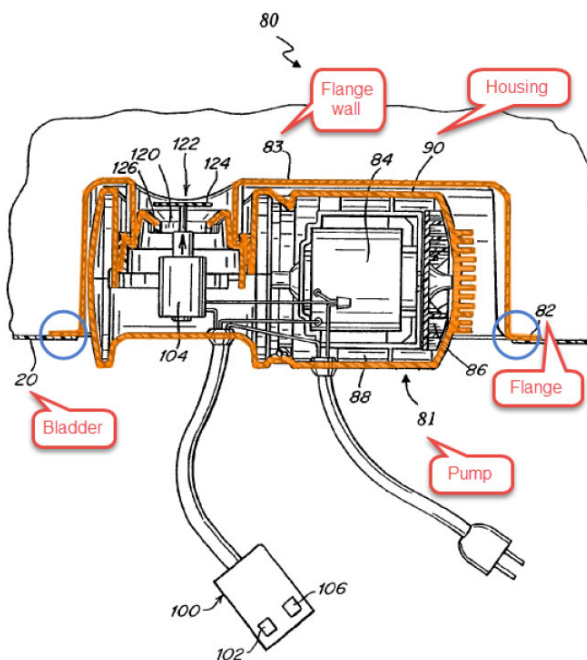


Fig. 5

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Pet. 42. Figure 5 depicts a cross-sectional view of one embodiment of fluid controller 80. *See* Ex. 1406, 2:38–39. In the annotated version of Figure 5 above, Petitioner added (1) a text box identifying element 82 as a “Flange,” (2) a text box identifying element 83 as a “Flange wall,” (3) a text box identifying element 90 as a “Housing,” (4) a text box identifying element 81 as a “Pump,” (5) a text box identifying element 20 as a “Bladder,” (6) an orange overlay to portions of elements 82, 83, and 90, and (7) blue circles at the “connection point[s]” between flange 82 and bladder 20. Pet. 42.

Referring to Figures 2 and 5 of Chaffee, Petitioner states that Chaffee discloses that “fluid controller 80, through its Housing [(i.e., elements 82/83/90)], is built into and recessed in inflatable bladder 20.” Pet. 40 (citing Ex. 1402 ¶ 189); *see also id.* at 41 (providing annotated versions of Figures 2 and 5 of Chaffee). Petitioner states that the “connection point between the Housing (orange) (through flange 82) and bladder 20” is described in Chaffee as “being accomplished, for example, by ‘adhesive or heat seal’ ([Ex. 1406], 4:67–5:2, 5:26), thus creating a built in connection between Housing and bladder 20 (the inflatable body).” Pet. 41 (citing Ex. 1402 ¶ 190; Ex. 1475, 23–24).

Patent Owner argues that Chaffee does not disclose the “built into” limitation and thus, even if combined, Chaffee and Wu do not satisfy this limitation. PO Resp. 21–32, 54–58; PO Sur-reply 2–8. We first address arguments related to the disclosures in Chaffee and then turn to arguments related to its prosecution history.

Patent Owner asserts that at least portions of the identified “housing” (i.e., elements 82/83/90) in Chaffee are removable from bladder 20, and thus, the “housing” fails to satisfy the “not detachable from” requirement of

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the “built into” limitation.¹¹ PO Resp. 54–58. Specifically, Patent Owner argues that, in Chaffee, “the thing that is arguably ‘built into’ the wall of the bladder [20] is flange 82,” but, according to Patent Owner, “flange 82 is separate from the housing 90.” *Id.* at 55–56. In support, Patent Owner provides the following annotated version of Figure 3 of Chaffee, with flange 82 shown in green and housing 90 shown in orange:

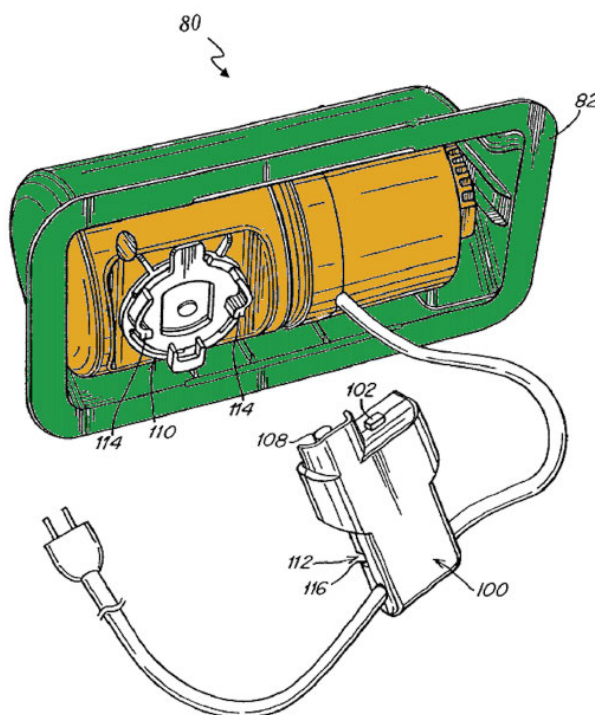


Fig. 3

PO Resp. 56; *see id.* at 31–32 (arguing that Figures 3–5 “all reflect a removable pump housing (orange) separate from the flange (green)”). Figure 3 depicts “a perspective, plan view of a fluid controller according to one embodiment.” Ex. 1406, 2:34–35. According to Patent Owner, Chaffee

¹¹ As discussed above, we construe “built into” in accordance with its plain and ordinary meaning in light of the Specification—“integrated into and not detachable from.” *See supra* § II.B.

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explains that the reason why the housing 90 and flange 82 are separate pieces and should be reversibly connected is to allow “the removal of portions of fluid controller 80 for repair or replacement, preventing the entire inflatable device from having to be disposed of in the event of a failure of one component.” PO Resp. 57 (quoting Ex. 1406, 5:44–48) (emphasis by Patent Owner omitted); *see id.* (discussing Ex. 1406, 5:22–26, 5:33–35). Patent Owner contends that “[t]he only thing that may be ‘built into’ the bladder 20 is the flange 82, in which case flange 82 is separate from the housing 90 to allow for easy removal of the housing 90 to facilitate repair or replacement of defective pump components.” *Id.* at 58.

In its Reply, Petitioner contends that Patent Owner’s argument addresses “Chaffee’s description of an *alternative* embodiment in which flange 82 and housing 90 are separate but connected” structures. Pet. Reply 7. Petitioner argues that statements such as at column 5, lines 33–35¹² “demonstrate that Chaffee contemplated another design in which flange 82 and housing 90 were not separate, connectable structures but, rather, different portions of the same structure.” *Id.* (citing Ex. 1625 ¶ 19). According to Petitioner, “Chaffee confirms this by stating ‘[f]lange 82 may, for example, extend from housing 90 or may be a separate component connected to housing 90.’” *Id.* at 7–8 (quoting Ex. 1625 ¶ 17 (quoting, with emphasis added, Ex. 1406, 5:7–9)) (citing Ex. 1625 ¶¶ 16, 20).

¹² “*Where flange 82 connects to housing 90 or another portion of fluid controller 80, it is preferred that such connection be reversible.*” Pet. Reply 7 (quoting Ex. 1406, 5:33–35, with emphasis added by Petitioner) (citing Ex. 1625 ¶ 19).

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Dr. Stevick testifies that “or” in the sentence at column 5, lines 7–9 of Chaffee means “said another way.” Ex. 1602, 611:15; *see also id.* at 610:21–611:5 (stating that with “or,” Chaffee is “repeating what he means”), 608:25–609:2 (stating that Chaffee uses “or” “to say it another way to be more clear”); Ex. 2429 ¶¶ 55, 87, 136–143 (testifying that flange 82 must be separate from housing 90). In contrast, Petitioner’s expert, Dr. Beaman, testifies that “or” indicates two “alternative designs.” Ex. 1625 ¶ 17, *cited at* Pet. Reply 7–8. Although the word “or” can, in some instances, have the meaning identified by Dr. Stevick, the word “or” in the sentence at issue is used in the disjunctive sense, i.e., to indicate that what precedes it is different from, or an alternative to, what follows. *See, e.g., SkinMedica, Inc. v. Histogen Inc.*, 727 F.3d 1187, 1199–1200 (Fed. Cir. 2013) (discussing how the use of a disjunctive “or” in a specification indicates alternatives). Based on this interpretation, we understand Chaffee to disclose at least two *different* embodiments: (1) an embodiment in which flange 82 and housing 90 (as well as wall 83) are different portions of the *same* structural component and (2) an embodiment in which flange 82 and housing 90 are separate, but connected, components. *See* Ex. 1406, 5:7–11; Ex. 1625 ¶ 17. Considering the record as a whole, we credit the testimony of Dr. Beaman over that of Dr. Stevick on this issue because Dr. Beaman’s view is consistent with our understanding of Chaffee as disclosing two different embodiments.

We turn now to the meaning of “extends from” in column 5, line 7–9 of Chaffee. We agree with Patent Owner that merely stating that flange 82 “extend[s] from” housing 90 does not, *by itself*, indicate whether the flange and housing are part of the same structural component or whether they are

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separate, but connected. *See* PO Resp. 22 n.5 (citing Ex. 2040, 268:12–272:3); PO Sur-reply 6–7 (stating that “Dr. Stevick and Dr. Beaman both agree that the ‘extends’ language does not clearly disclose a one-piece embodiment”). Patent Owner’s view, however, analyzes “extends from” in a vacuum rather than in the context of Chaffee overall. *See* Ex. 1625 ¶ 20 (“As I testified, the ‘extend[s] from’ language in Chaffee must be read in context, as any [person of ordinary skill in the art] would do.” (citing Ex. 2040, 268:22–269:2, 269:6–8, 270:5–9)), *cited at* Pet. Reply 7–8. In context and for the reasons discussed above, we understand the presence of a disjunctive “or” in the same sentence to indicate that the disclosure that flange 82 may “extend from” housing 90—which precedes the “or”—would be understood as *different* from (i.e., an alternative to) the disclosure that flange 82 “may be a separate component connected to housing 90”—which follows the “or.” *See* Ex. 1406, 5:7–9.

As argued by Petitioner (Pet. Reply 7–8), Patent Owner focuses on disclosures related to embodiments in which flange 82 and housing 90 are *separate but connected*. *See* PO Resp. 57 (discussing Ex. 1406, 5:22–26 (disclosing that “flange 82 may be constructed of a material that is more flexible than housing 90”), 5:33–35 (“Where flange 82 connects to housing 90 or another portion of fluid controller 80, it is preferred that such connection be reversible.” (emphasis added))), 5:44–48 (discussing how “the reversible connection [discussed in the prior quotation] allows the removal of portions of fluid controller 80 for repair or replacement” (emphasis added))). For example, we view the terms “connects to” and “connection” in two of the disclosures relied on by Patent Owner (*see* Ex. 1406, 5:33–35, 5:44–48, *quoted at* PO Resp. 57) as referring back to the initial disclosure of

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an embodiment in which flange 82 “may be a separate component *connected to* housing 90” (Ex. 1406, 5:7–9 (emphasis added)). *See* Pet. Reply 7 (citing Ex. 1625 ¶ 19) (“Such statements demonstrate that Chaffee contemplated another design in which flange 82 and housing 90 were not separate, connectable structures but, rather, different portions of the same structure.”).

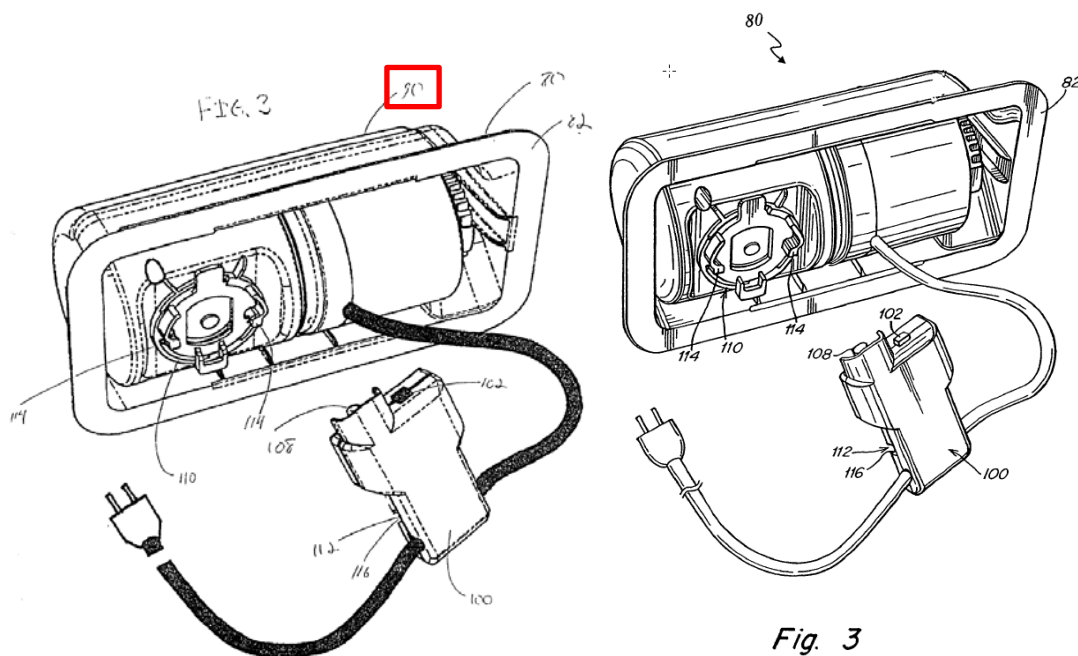
In addition, we view the phrase “[i]n either case” (Ex. 1406, 5:44) as referring to two possible “reversible connection[s]” (*id.* at 5:43–44), both of which *fall within the scope* of the initial disclosure of an embodiment in which flange 82 “may be a separate component connected to housing 90” (*id.* at 5:7–9): one version in which housing 90 can disconnect from flange 82 (*id.* at 5:33–35) and another version in which the *entire* fluid controller 80 (which includes flange 82 and housing 90) can disconnect from bladder 20 (*id.* at 5:41–44). Based on the understanding discussed above of Chaffee’s disclosure that flange 82 may, for example, “extend from” housing 90, we do not agree with Patent Owner’s position that Chaffee *only* discloses embodiments in which at least one portion of the identified “housing” is removable from bladder 20. *See* PO Resp. 57–58.

We do, however, agree with Patent Owner’s argument that Figure 5 of Chaffee does not necessarily depict an embodiment in which flange 82 and housing 90 (as well as wall 83) are different portions of the *same* structural component. *See* PO Resp. 30–31 (citing Ex. 2029 ¶¶ 84–85). That said, the *disclosures* of Chaffee are not limited to only the *depictions* in the figures. And here, Petitioner has clearly relied on the statement at column 5, lines 7–9 of Chaffee to support its position as to the “built into” limitation. *See* Pet. 39–40 (identifying a “housing”); Pet. Reply 7–8.

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We turn now to arguments based on Chaffee's prosecution history. Patent Owner argues that, in light of the prosecution history, one of skill in the art would not have understood Chaffee to disclose the embodiment relied on by Petitioner (as discussed above). PO Resp. 21–30, 32; PO Sur-reply 2–4, 7–8. Patent Owner also argues that certain amendments to the original figures (discussed below) remove Chaffee as prior art in this proceeding. *Id.* We discuss each position in turn, after a background of the relevant events from the prosecution history of Chaffee, which are not in dispute.

Chaffee issued on May 9, 2006, from U.S. Patent Application No. 09/859,706 (the “’706 application”), filed on May 17, 2001. *See* Ex. 1406, codes (45), (21), (22). Original Figures 3 and 4 filed with the ’706 application had an additional reference numeral “90” not present in the issued version of Chaffee. Below, original Figure 3 (left) and issued Figure 3 (right) are reproduced with a red box added to identify the additional reference numeral “90” in original Figure 3:

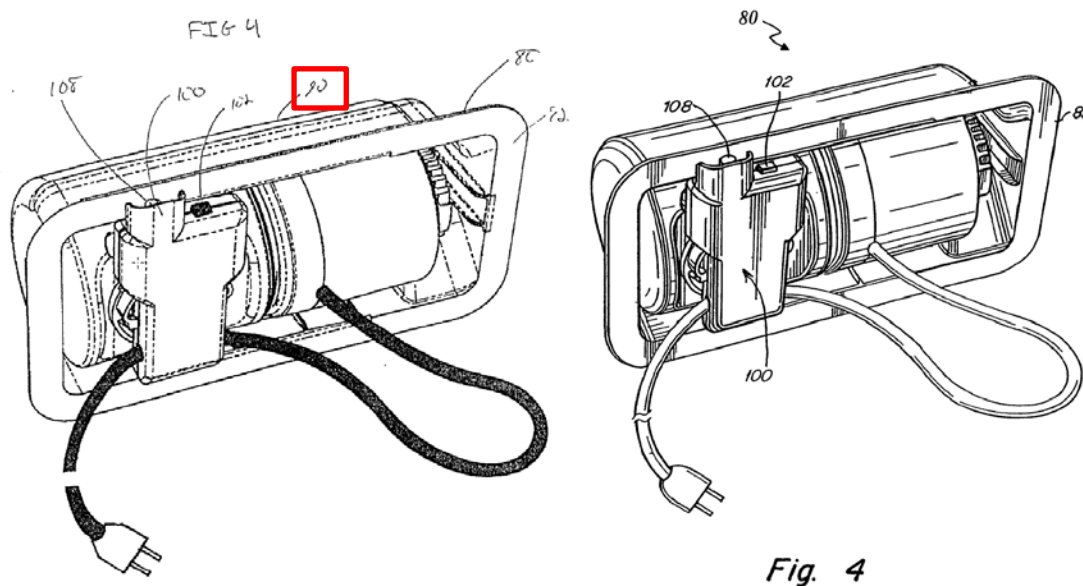


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Ex. 2441 (file history of the '706 application), 19; Ex. 1406, Fig. 3. Figure 3 depicts a perspective view of one embodiment of fluid controller 80. *See* Ex. 1406, 2:34–35.

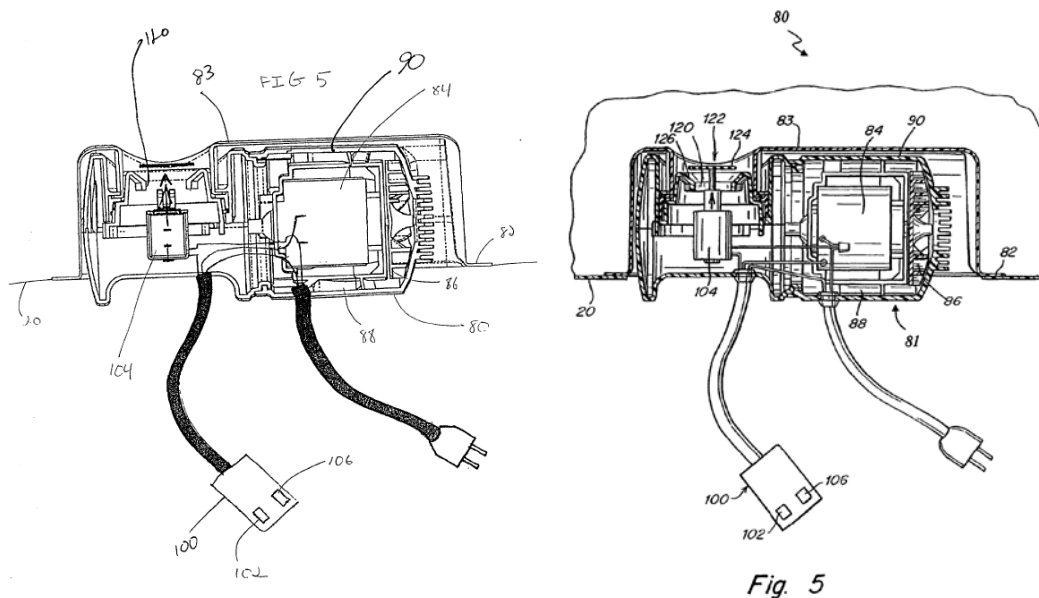
Below, original Figure 4 (left) and issued Figure 4 (right) are reproduced with a red box added to identify the additional reference numeral “90” in original Figure 4:



Ex. 2441, 20; Ex. 1406, Fig. 4. Figure 4 depicts a perspective view of one embodiment of fluid controller 80. *See* Ex. 1406, 2:36–37.

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Below, original Figure 5 (left) and issued Figure 5 (right) are reproduced:



Ex. 2441, 21; Ex. 1406, Fig. 5. Figure 5 depicts a cross-sectional view of one embodiment of fluid controller 80. *See* Ex. 1406, 2:38–39. Mr. Chaffee filed formal drawings in December 2002, which included the additional reference numerals “90” from the original drawings. *See* Ex. 2441, 116–21.

In an Office Action dated September 7, 2005, the examiner objected to the drawings:

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character “90” has been used to designate both the housing (90) connected to the flange (82) as shown in Fig. 3 and the housing or covering around the motor (84), impeller (86), conduit (88), solenoid (104), etc. as shown in Fig. 5. There appear[] to be two different structures which Applicant is referring to as a “housing” and these two different structures are being confused with each other. Each of the two different structural elements should be given a separate reference numeral.

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The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference numerals “83” and “90” have both been used to designate “fluid impermeable wall” (see Fig. 5) and “housing” (see Fig. 3).

Ex. 2441, 448–49. In response, Mr. Chaffee modified the then-pending Figures 3 and 4 by deleting the additional reference numerals “90.” *See id.* at 498–99 (showing revisions to Figures 3 and 4 in an Amendment, dated December 7, 2005), 542–43 (showing revisions to Figures 3 and 4 in a Supplemental Amendment, dated December 8, 2005). In discussing these Amendments, Mr. Chaffee stated: “Applicant has deleted reference character 90 from FIGS. 3 and 4 of the enclosed annotated drawings so as to eliminate any confusion.” *Id.* at 491 (Amendment), 533 (Supplemental Amendment).

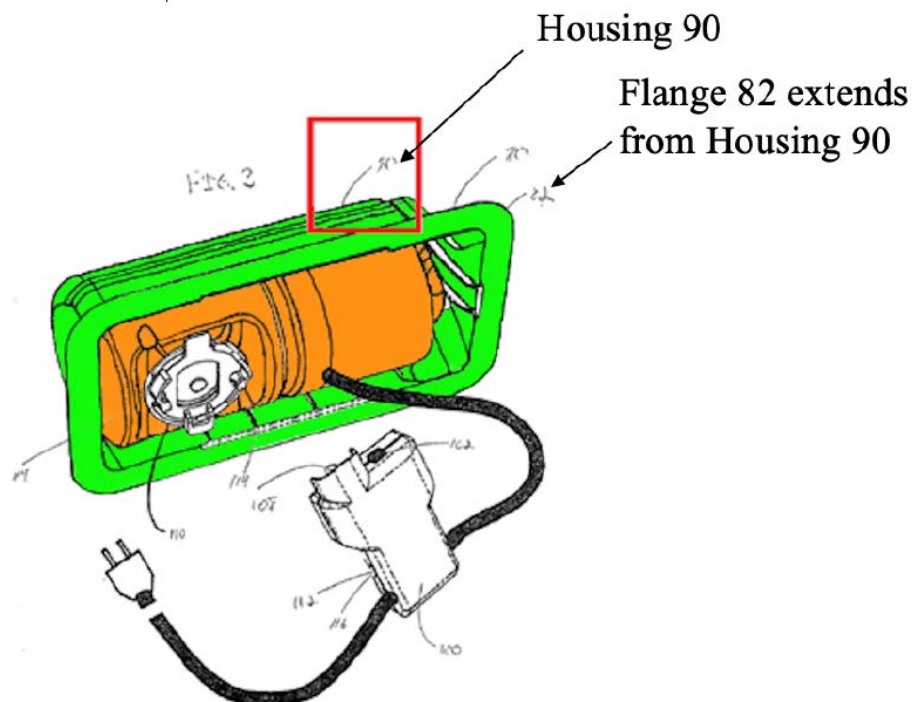
With that background, we turn to Patent Owner’s arguments. Patent Owner contends that original Figures 3 and 4 “explain how the ‘extend from housing 90’ phrase [(Ex. 1406, 5:8)] was not a teaching of a one-piece ‘Chaffee Housing’ as Petitioner[] allege[s], but rather a literal description of F[igures] 3–4 as they were originally filed.” PO Resp. 22–23 (citing Ex. 2429 ¶¶ 70–71). According to Patent Owner,

Chaffee’s original disclosure is evidence that the “extend from” phrase of Chaffee 5:7–9 is a direct reference to the green “housing” “90” structure of F[igure] 3 as filed, which is fluid impermeable wall 83 in [Chaffee as issued]. ***It is not a teaching that a flange extends from the orange pump housing as Petitioner[] contend[s].***

PO Resp. 29. In support, Patent Owner provides the following annotated version of original Figure 3 of Chaffee:

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PO Resp. 28–29. The annotated version of original Figure 3 of Chaffee above shows (1) an outer structure overlaid in green, (2) an inner structure overlaid in orange, (3) a red box around additional reference numeral “90” with a text box stating “Housing 90” pointing to the same, and (4) a text box stating “Flange 82 extends from Housing 90” pointing to reference numeral 82. *Id.* at 29.

We are not persuaded by Patent Owner’s argument that the prosecution history of Chaffee undermines the understanding of “extend from” (Ex. 1406, 5:7–9) discussed above. As an initial matter, to the extent Patent Owner relies on the subjective intent of Mr. Chaffee during drafting, the proper analysis looks at how one of ordinary skill in the art at the time of the invention would have understood the relied-upon disclosures in the Chaffee patent. *See* PO Resp. 29 (“Had Chaffee’s attorney *intended* the orange pump housing to be one piece with flange 82, he could have argued that the orange and green housings were one and the same and would not

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have deleted character ‘90.’ He did not argue that they were the same.” (emphasis added)); *cf. Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1372–73 (Fed. Cir. 2019) (affirming an obviousness determination in an *inter partes* review in which a first prior art reference disclosed all of the claim limitations and a second prior art reference was used to “demonstrate that a person of ordinary skill in the art would have understood” that a teaching in the first reference satisfied a claim limitation); *see also KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (stating that the obviousness “analysis is objective”).

In addition, the complete record developed at trial does not support Patent Owner’s position as to the meaning of “[f]lange 82 may, for example, extend from housing 90.” Ex. 1406, 5:7–9. First, as noted by Petitioner (Pet. Reply 8), the text in Chaffee (i.e., the written description) has consistently used reference numeral “90” to refer to a “housing[] that surrounds the inner workings of the pump” and can “provide a connection between fluid controller 80 and bladder 20” by, e.g., flange 82 extending therefrom. *Compare* Ex. 2441, 8:5–8, 9:9–12,¹³ *with* Ex. 1406, 4:17–22, 5:4–9; Ex. 1406, 5:7–8. Mr. Chaffee’s statements filed with the drawing Amendments at issue further support this understanding:

It is clear from the specification that the reference character 90 refers to the housing 90 that surrounds the inner workings of the pump 81, such as the motor (84), impeller (86), conduit (88), solenoid (104), etc., and can also serve as a connection between the fluid controller 80 and the bladder 20.

¹³ These citations to Exhibit 2441 refer to the page numbers added for this proceeding, not the internal pagination.

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Ex. 2441, 491 (Amendment), 533 (Supplemental Amendment) (same),
quoted at Pet. Reply 9.

Second, as also noted by Petitioner (Pet. Reply 9), the labelling in original Figure 5 in Chaffee—and issued Figure 5—remained unchanged as to housing 90, and consistently supported the understanding of housing 90 as a structure surrounding the inner workings of the pump (rather than identifying the structure referred to as wall 83 in Chaffee as issued).¹⁴ *See* Ex. 2441, 21 (original Figure 5), 119 (formal version of original Figure 5), 500 (showing revisions in Amendment), 544 (same in Supplemental Amendment), 508 (showing issued version in Amendment), 552 (same in Supplemental Amendment); Ex. 1406, Fig. 5, 5:10–11 (discussing “fluid impermeable wall 83”). In light of the complete record, we find that one of ordinary skill in the art would have understood housing 90 as a structure that “surrounds the inner workings of the pump” and can “provide a connection between fluid controller 80 and bladder 20” by (in one embodiment) flange 82 extending from housing 90 as a different portion of the same structural component.

We turn now to Patent Owner’s argument that the amendments discussed above remove Chaffee as prior art in this proceeding. PO Resp. 21–30, 32; PO Sur-reply 2–4, 7–8. Relevant to this issue, Petitioner states: “Chaffee is prior art under 35 U.S.C. § 102(e) as it stems from a nonprovisional application (Application No. 09/859,706) that was filed on

¹⁴ As discussed above, however, we agree with Patent Owner that Figure 5 does not necessarily depict an embodiment in which flange 82 and housing 90 (as well as wall 83) are different portions of the *same* structural component. *See supra* p. 29.

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May 17, 2001 (*see generally* Ex. 1406), which precedes the June 22, 2001 Priority Date of the '394 Patent.” Pet. 28 n.2. As discussed above, the amendments were filed in December 2005. Patent Owner argues that, by deleting the reference numerals “90” from original Figures 3 and 4, Mr. Chaffee “attempted to redefine housing 90 as the housing that ‘surrounds the inner workings of the pump 81 [‘81’ was simultaneously newly added to FIG. 5 to replace ‘80.’].” PO Resp. 29 (citing Ex. 2441, at 491, 500) (bracketed text added by Patent Owner). Patent Owner notes that the amendments “were made starting in 2005, years after the 2001 effective filing date of the '394 Patent.” *Id.* Patent Owner then concludes that Chaffee “is not a proper printed publication for challenging the '394 Patent claims because its disclosure was modified years after the effective filing date of the '394 Patent.” *Id.* at 32 (citing Ex. 2429 ¶¶ 88–89).

As an initial matter, we are not persuaded by Patent Owner’s argument that, with the amendments, Mr. Chaffee “attempted to redefine” housing 90. PO Resp. 29. Instead, for the reasons discussed above (*see supra* pp. 33–36), the record supports Petitioner’s argument that the amendments merely aligned Figures 3 and 4 with the rest of the specification as to housing 90. Pet. Reply 8–10.

Further, we understand Patent Owner to contend that the amendments constitute new matter and that, based on that alleged new matter, the effective filing date of Chaffee is now in December 2005, which would post-date the effective filing date of the '394 patent. *See, e.g., Nat. Alt. Int’l v. Iancu*, 904 F.3d 1375, 1383 (Fed. Cir. 2018) (discussing how new matter added during prosecution can change the effective filing date of a prior art reference); *see also* PO Sur-reply 7 (stating that “new matter is a basis for

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forfeiting an effective filing date”). Patent Owner argues that the amendments “are not immaterial” and that “[t]here is no support . . . for deleting reference numbers on figures without changing scope.” PO Sur-reply 7.

Petitioner argues persuasively that Patent Owner does not adequately explain *why* the amendments amount to new matter. *See* Pet. Reply 10 (contending that this argument is “undeveloped” and “ cursory” and that Patent Owner has not “articulated a cognizable new matter argument”). Patent Owner cites to the testimony of Dr. Stevick on this issue, but Dr. Stevick essentially restates Patent Owner’s argument. *Compare* Ex. 2429 ¶¶ 88–89, *with* PO Resp. 32; 37 C.F.R. § 42.65(a). For the same reasons discussed above, Petitioner argues persuasively that the amendments merely removed clerical errors in the original drawings to align those drawings with the rest of the specification as to housing 90, and thus, did not constitute new matter. *See* Pet. Reply 8–10.¹⁵ As noted by Petitioner, the examiner did not issue a new matter objection in the wake of the amendments. *See id.* at 10 (citing *Commonwealth Sci. v. Buffalo Tech.*, 542 F.3d 1363, 1380 (Fed. Cir. 2008)).

For the reasons above, we find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee discloses the “built into” limitation.

(5) *The “Air Conduit” Limitation*

Claim 1 recites:

an air conduit disposed at least in part in the housing, the air conduit being movable between a first position and a second

¹⁵ For similar reasons, we do not agree with Patent Owner that the amendments rendered Chaffee “ambiguous.” PO Sur-reply 8.

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position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position.

Ex. 1401, 8:29–35 (“the ‘air conduit’ limitation”). Petitioner states that Chaffee as modified by Wu satisfies this limitation. Pet. 43 (citing Ex. 1002 ¶ 193); *see also* Pet. 43–56 (discussing this limitation). Petitioner states that “Chaffee d[oes] not disclose a movable air conduit, as its air pump is a Reversible Pump Assembly” and that, “instead of using a directional control valve, such as the claimed movable air conduit, to switch between inflate and deflate functionality, Chaffee disclose[s] reversing the direction of its motor.” Pet. 43 (citing Ex. 1402 ¶ 194). Petitioner argues that Wu teaches a “Uni-directional Pump Assembly” and Petitioner provides reasons (which we discuss below (*see infra* § II.C.3.a.7)) why one of ordinary skill in the art “would have been motivated to use a Uni-directional Pump Assembly in place of Chaffee’s Reversible Pump Assembly.” Pet. 43 (citing Ex. 1402 ¶¶ 195–196). According to Petitioner, blower 15 and rotary valve 100 in Wu are included in the Uni-directional Pump Assembly. Pet. 43–44. Petitioner states that “[u]sing a Uni-directional Pump Assembly as taught by Wu in place of Chaffee’s Reversible Pump Assembly would have resulted in an apparatus that disclose[s] each feature of this limitation.” Pet. 46 (citing Ex. 1402 ¶ 203).

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Petitioner provides the annotated version of Figure 1 of Wu below:

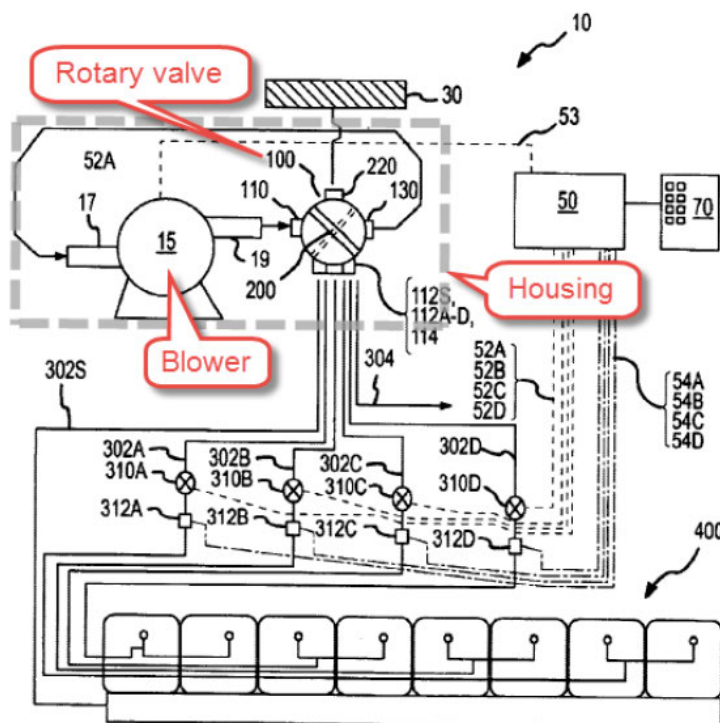


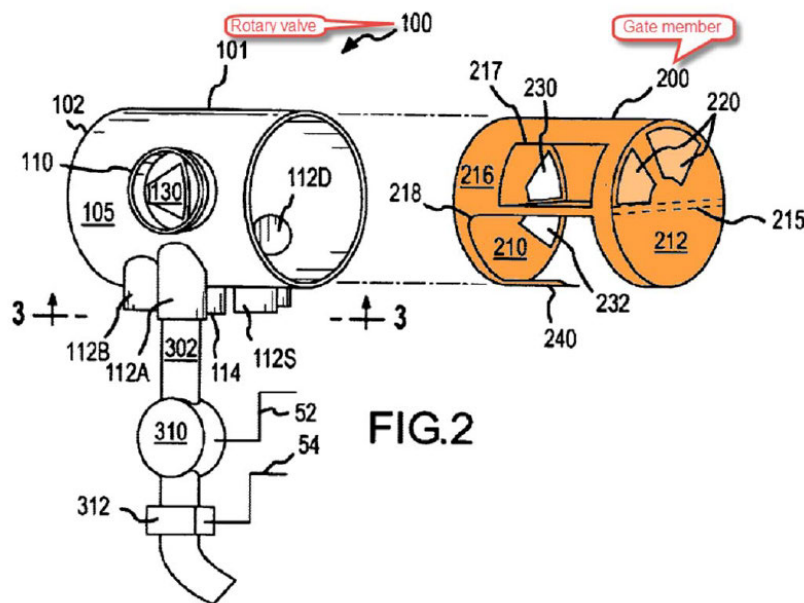
FIG.1

Pet. 47. Figure 1 depicts a schematic representation of the overall disclosed system 10, which includes, among other aspects, electric motor powered blower 15, two-position rotary valve 100, and air mattress supply lines 302A–D and 302S for supplying air to air mattress 400. Ex. 1405, 2:43–48. In the annotated version of Figure 1 of Wu above, Petitioner added (1) a text box identifying element 15 as a “Blower,” (2) a text box identifying element 100 as a “Rotary valve,” and (3) a gray dotted outline and text box identifying a “Housing.” Pet. 47. Petitioner states that “[t]o take advantage of the[] benefits that accompany a Uni-directional Pump Assembly, [one of ordinary skill in the art] would have relied on Wu’s blower 15 . . . and rotary valve 100 teachings in accomplishing this conversion of Chaffee’s pump

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81.” Pet. 46 (citing Ex. 1402 ¶¶ 195, 121). Referring to the annotated version of Figure 1 of Wu above, Petitioner states that in the proposed modified device “Chaffee’s Housing (represented in gray, [above]) would simply surround Wu’s blower 15 (the fan and motor) and rotary valve 100 and instead of Wu’s air mattress 400 (as shown [above]), the system would route air to Chaffee’s bladder 20.” Pet. 46–47 (citing Ex. 1402 ¶¶ 195, 121).

Petitioner then provides the following annotated version of Figure 2 of Wu, which adds (1) text boxes identifying rotary valve 100 and gate member 200 and (2) orange overlay to gate member 200.



Pet. 48. Figure 2 depicts a perspective view of rotary valve 100. Ex. 1405, 2:36–37, 4:60–61. According to Petitioner, “in converting Chaffee’s Reversible Pump Assembly in view of Wu, [one of ordinary skill in the art] would have maintained Chaffee’s Housing-contained design . . . , such that the movable air conduit (e.g., Wu’s rotary valve 100) and the fan and motor (e.g., Wu’s blower 15) was disposed inside Chaffee’s Housing.” Pet. 48 (citing Ex. 1402 ¶¶ 205–208) (referencing Pet. 38–43). Petitioner then

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provides reasons (which we also discuss below (*see infra* § II.C.3.a.7)) for maintaining “Chaffee’s Housing-contained design” in the proposed modification of Chaffee based on Wu.¹⁶ Pet. 48–49 (citing Ex. 1402 ¶¶ 206–209). According to Petitioner, “Chaffee pump 81[,] converted into a Uni-directional Pump Assembly in view of Wu’s rotary valve 100 and blower 15 teachings[,] disclose[s] a movable air conduit (Wu’s gate member 200) disposed in the housing (Chaffee’s Housing).” Pet. 49 (citing Ex. 1402 ¶ 210).

Petitioner argues that “Wu’s gate member 200 (the air conduit) has a first position for inflation.” Pet. 49 (citing Ex. 1405, 3:3–6; Ex. 1402 ¶ 211). Petitioner provides the following annotated version of Figure 1 of Wu, which adds (1) blue arrows showing the direction of air flow in the inflation configuration, (2) orange overlay to portions of gate member 200, (3) a text box identifying element 15 as a “Blower,” (4) a text box identifying element 200 as a “Gate member,” and (5) a gray dotted outline and text box identifying a “Housing.”

¹⁶ For consistency, below, we use the phrase “Chaffee’s Housing-contained design” in the same manner as used by Petitioner.

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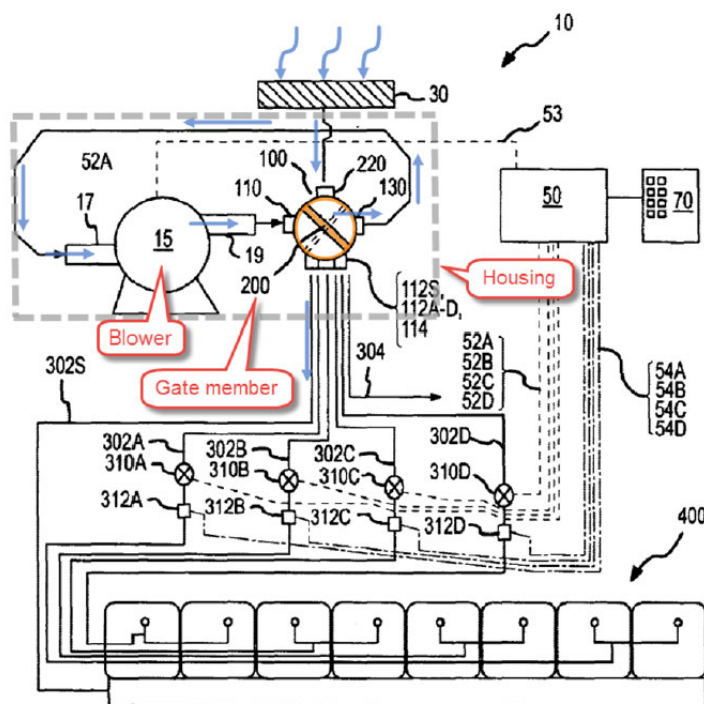


FIG.1

Pet. 50. Figure 1 depicts a schematic representation of the overall disclosed system 10. Ex. 1405, 2:43–48. Referring to the annotated version of Figure 1 above, Petitioner highlights Wu’s disclosure that when “gate member 200 [orange] is in the first, pressurizing position, air [blue] from blower 15 is routed to air mattress 400 shown in FIG. 1, while outside air [blue] is drawn in through filter 30 shown in FIG. 1 and into the intake of blower 15.” Pet. 49–50 (quoting, with bracketed text added by Petitioner, Ex. 1405, 5:67–6:4) (citing Ex. 1405, Fig. 2; Exs. 1468, 1470; Ex. 1402 ¶¶ 211–212).

Petitioner argues that “Wu’s gate member 200 (the movable air conduit) has a second position for deflation.” Pet. 53 (citing Ex. 1405, 5:44–48; Ex. 1402 ¶ 218). Petitioner provides the following additional annotated version of Figure 1 of Wu, which adds (1) blue arrows showing the direction

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of air flow in the deflation configuration, (2) orange overlay to portions of gate member 200, (3) a text box identifying element 15 as a “Blower,” (4) a text box identifying element 200 as a “Gate member,” and (5) a gray dotted outline and text box identifying a “Housing.”

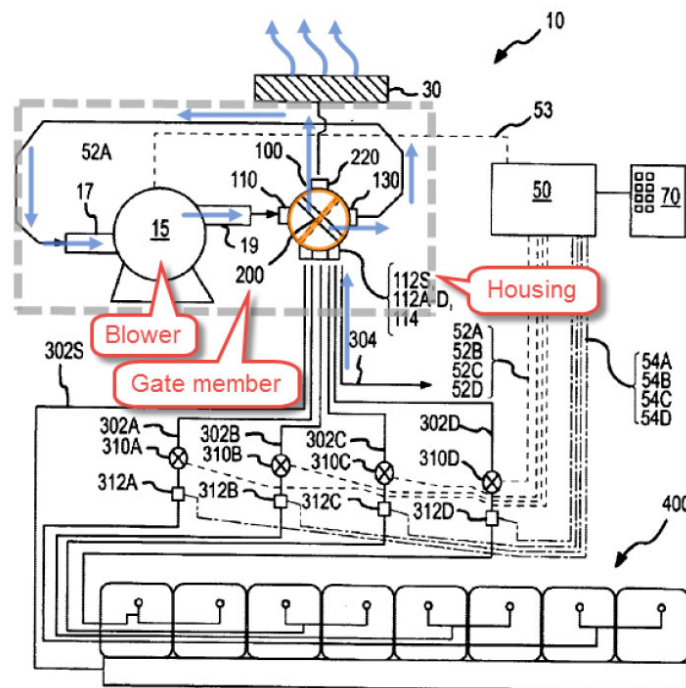


FIG. 1

Pet. 54. Figure 1 depicts a schematic representation of the overall disclosed system 10. Ex. 1405, 2:43–48. Referring to the annotated version of Figure 1 above, Petitioner highlights Wu’s disclosure that when “in the second position, gate member 200 directs air [blue arrows] from air mattress 400 into intake 17 of blower 15 while air leaving blower 15 is directed through filter 30 to the outside environment.” Pet. 53 (quoting, with bracketed text added by Petitioner, Ex. 1405, 4:54–59) (citing Ex. 1405, Fig. 2; Exs. 1469, 1470; Ex. 1402 ¶ 219). According to Petitioner, “[a]pplying this teaching to Chaffee, this movable air conduit[, when in the] second position[,] would

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route air from Chaffee’s bladder 20, rather than air mattress 400 (shown [above]), to atmosphere and remain disposed in Chaffee’s Housing (represented in gray, [above]).” Pet. 53 (citing Ex. 1402 ¶¶ 218–219).

The record evidence, summarized above, supports Petitioner’s position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Wu discloses the subject matter of the “air conduit” limitation. Patent Owner does not dispute that Chaffee as modified by Wu discloses the subject matter of this limitation.¹⁷

(6) The “Wherein” Limitation

In the final clause, claim 1 recites “wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.” Ex. 1001, 8:36–38 (“the ‘wherein’ limitation”). Petitioner states that Chaffee as modified by Wu satisfies this limitation. Pet. 56 (citing Ex. 1402 ¶ 225). According to Petitioner, “Chaffee disclose[s] that air flows between the interior region of the Housing and the inflatable body 20 during inflation and deflation, as fluid controller 80 ‘control[s] the flow of fluid *into* and/or *out* of bladder 20’ and did so through outlet 120.” Pet. 56–57 (citing Ex. 1406, 3:60–61 (emphasis added by Petitioner); Ex. 1402 ¶ 226). Petitioner provides the following annotated version of Figure 5 of Chaffee, which adds (1) a text box identifying element 20 as a “Bladder,” (2) a text box identifying element 81 as a “Pump,” (3) text boxes identifying an “Outlet” and an “Interior Region,” (4) orange overlay to motor 84, (5) blue

¹⁷ We address below Patent Owner’s arguments that one of ordinary skill in the art would not have modified Chaffee based on Wu as proposed. *See infra* § II.C.3.a.7.

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overlay to impeller 86, and (6) a blue line from the “Outlet” through the “Interior Region” and through impeller 86.

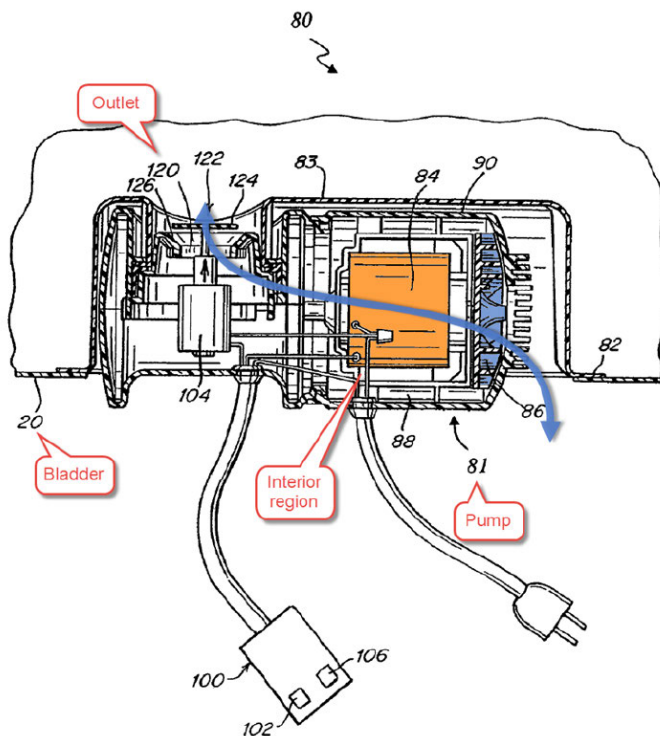


Fig. 5

Pet. 58. Figure 5 of Chaffee depicts “a top, cross-sectional view of one embodiment.” Ex. 1406, 2:38–39. Referring to the annotated version of Figure 5 above, Petitioner states that “the motor and fan (which, as modified, is Wu’s blower 15, rather than the motor 84 [orange] and impeller 86 [blue], shown [above]) inside of the Housing is what ‘mov[es] air [blue arrow] into, or out of, bladder 20’ through outlet 120.” Pet. 57 (quoting Ex. 1406, 3:67 (bracketed text added by Petitioner)) (citing Ex. 1402 ¶ 226). Petitioner states that “[t]his air flow path would not have changed in converting Chaffee into a Uni-directional Pump Assembly” as proposed. *Id.* (citing Ex. 1402 ¶ 226).

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The record evidence, summarized above, supports Petitioner’s position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Wu discloses the subject matter of the “wherein” limitation. Patent Owner does not dispute that Chaffee as modified by Wu discloses the subject matter of this limitation.

(7) The Asserted Reasons to Modify Chaffee with Wu

As discussed above, Petitioner presents two different aspects of the proposed modification of Chaffee based on Wu: (1) modifying Chaffee’s reversible pump assembly to a unidirectional pump assembly based on Wu (*see, e.g.*, Pet. 43–47, *discussed supra* §§ II.C.3.a.2, II.C.3.a.5) and (2) maintaining Chaffee’s Housing-contained design in the proposed modified device (*see, e.g.*, Pet. 48–49, *discussed supra* § II.C.3.a.5). We discuss these two aspects in turn below.

Modifying Chaffee’s Reversible Pump Assembly to a Uni-directional Pump Assembly Based on Wu

According to Petitioner, one of ordinary skill in the art at the time of the invention “would have had several reasons to use a Uni-directional Pump Assembly in place of Chaffee’s Reversible Pump Assembly” (Pet. 38 (citing Ex. 1402 ¶ 185)), and as a result “would have been motivated to use Wu’s teachings of a uni-directional blower 15 in converting Chaffee’s pump 81 into a Uni-directional Pump Assembly” (*id.* (citing Ex. 1402 ¶¶ 183–185)). Specifically, Petitioner argues: (1) “using Wu’s Uni-directional Pump Assembly teachings would have promoted **spatial efficiency** compared to Chaffee’s pump 81” (Pet. 44 (citing Ex. 1402 ¶¶ 197–198)); (2) “using Wu’s Uni-directional Pump Assembly teachings would have increased the **energy**

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efficiency of Chaffee’s pump 81” (Pet. 44–45 (citing Ex. 1402 ¶ 199)); (3) “using Wu’s Uni-directional Pump Assembly teachings would have decreased Chaffee’s **cost**” (Pet. 45 (citing Ex. 1402 ¶ 200)); (4) “using Wu’s Uni-directional Pump Assembly teachings would have decreased the **weight** of Chaffee’s pump 81” (*id.* (citing Ex. 1402 ¶ 201)); and (5) one of ordinary skill in the art “would have understood that applying Wu’s Uni-directional Pump Assembly teachings to Chaffee was nothing more than a simple substitution of known elements (a Uni-directional Pump Assembly for a Reversible Pump Assembly) to achieve a predictable result (a pump capable of power inflate, power deflate)” (Pet. 46 (citing Ex. 1402 ¶ 202)).

For the reasons discussed below, we determine that the record here supports Petitioner’s assertion that one of ordinary skill in the art would have modified Chaffee’s reversible pump assembly to a unidirectional pump assembly at least for improved energy efficiency. *See* Pet. 44–45 (citing Ex. 1402 ¶ 199)). In support of the alleged improved energy efficiency of this aspect of the proposed modification, Petitioner states that one of ordinary skill in the art would have “understood that ‘the pump efficiency of a one-directional pump [like Wu’s] is greater than the efficiency of a reversible pump [like Chaffee’s].” Pet. 44–45 (quoting Ex. 1412, 1:54–56 (bracketed text added by Petitioner)).¹⁸ Petitioner also states that one of ordinary skill in the art “would have desired a more efficient pump.” Pet. 45 (citing Ex. 1406, 4:29–32 (“The pump also may be small and consume as little power as possible. Low power consumption is particularly desirable

¹⁸ The cited passage from Scott provides: “It is a further advantage of the present invention, that the pump efficiency of a one-directional pump is greater than the efficiency of a reversible pump.” Ex. 1412, 1:54–56.

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where the pump is to be powered by batteries, as it may extend battery life.”); Ex. 1402 ¶ 199).

Patent Owner presents certain arguments addressing this aspect of the proposed modification. First, Patent Owner argues that the only support for Petitioner’s position as to the improved energy efficiency of the proposed modification “is a single sentence from the Scott patent (Ex. 1412, 1:54–56) – a reference not used” in this ground. PO Resp. 41. According to Patent Owner, “[t]here are no other facts or evidence supplied by Petitioner[] or Dr. Beaman to support” the proposition that “using Wu’s Uni-directional Pump Assembly teachings would have increased the energy efficiency of Chaffee’s pump 81.” *Id.* According to Patent Owner, Dr. Beaman’s reliance on a statement in Chaffee on this issue (*see* Ex. 1402 ¶ 199 (citing Ex. 1406, 4:29–30)) is improper because “Dr. Beaman ignores the immediately succeeding passage from Chaffee that shows optimizations to the Chaffee reversible pump design can be made without converting to a uni-directional pump.” *Id.* at 41–42 (citing Ex. 1406, 4:33–36; Ex. 2429 ¶ 107).

Petitioner responds that “Chaffee confirms that [one of ordinary skill in the art] would seek a pump design with maximal efficiency, like a Unidirectional Pump Assembly.” Pet. Reply 19 (citing Ex. 1625 ¶ 63) (referencing Ex. 1406, 4:29–30).

Patent Owner’s arguments directed to Scott do not identify a deficiency in Petitioner’s position. As an initial matter, that Scott is not one of the two prior art references forming the basis for this ground does not undermine Petitioner’s reliance on a statement from Scott to support a motivation to modify Chaffee based on Wu. *Cf. KSR*, 550 U.S. at 419 (“The obviousness analysis cannot be confined by a formalistic conception of the

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words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents.”).

Moreover, Scott itself constitutes evidence in the record, and, for reasons discussed below, Petitioner provides persuasive evidence that the passage it relies on (column 1, lines 54–56) *at least suggests* to one of ordinary skill in the art that a unidirectional pump assembly has pump efficiency advantages over a reversible pump assembly. *See In re Kotzab*, 217 F.3d 1365, 1370 (Fed. Cir. 2000) (“The motivation, suggestion or teaching may come explicitly from statements in the prior art, the knowledge of one of ordinary skill in the art, or, in some cases the nature of the problem to be solved. In addition, the teaching, motivation or suggestion *may be implicit from the prior art as a whole*, rather than expressly stated in the references.” (emphasis added) (internal citation omitted)); *see also* Ex. 1412, 1:54–56 (“It is a further advantage of the present invention, that the pump efficiency of a one-directional pump is greater than the efficiency of a reversible pump.”).

We are also not convinced by Patent Owner’s contention that, based on the passage at column 4, lines 33–36 of Chaffee, one of ordinary skill in the art would have optimized Chaffee in a way *other than* modifying its reversible pump assembly to a unidirectional pump assembly as proposed. *See* PO Resp. 41–42; *see also id.* at 39 (arguing that one of ordinary skill in the art “would appreciate that Chaffee’s reversible pump could be optimized in a number of ways without changing to a one-directional pump as allegedly suggested by Scott”). The issue here is not whether one of ordinary skill in the art *could have* optimized Chaffee *without* performing the proposed modification, but rather whether one of ordinary skill in the art

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would have modified Chaffee, as proposed, for the reasons provided by Petitioner. *See KSR*, 550 U.S. at 420 (stating that “any need or problem known in the field of endeavor at the time of the invention and addressed by the patent can provide a reason for combining the elements in the manner claimed”). Moreover, even assuming the “optimized” version of Chaffee discussed by Patent Owner (PO Resp. 39) is superior to the proposed modified device, that “better alternatives” may exist “does not mean that an inferior combination is inapt for obviousness purposes” (*In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012)).

As its second argument on this aspect of the proposed modification, Patent Owner contends that the proposed modification is not supported by a *different* statement from Scott, cited by Petitioner in several of the *other* reasoning statements summarized above and identified by Patent Owner as “Scott’s Efficiency Statement” (*see* PO Resp. 36 (discussing Ex. 1412, 1:40–45)). PO Resp. 36–39. Patent Owner argues that one of ordinary skill in the art “would appreciate that Scott’s Efficiency Statement is a generalization that compares one-directional and reversible pumps *of the same type*, and does not apply without qualification to reversible and one-directional pumps and motors.” *Id.* at 36–37. According to Patent Owner, one of ordinary skill in the art “would appreciate that it is inappropriate to apply Scott’s Efficiency Statement to compare the pumps of Chaffee and Wu because they are different types of fan pumps,” with Chaffee disclosing an “axial fan pump” and Wu disclosing a “radial fan pump.” *Id.* at 37 (citing Ex. 2429 ¶ 99; Ex. 1405, 2:56–57).

Petitioner replies that “Scott’s ‘efficiency statements’ apply to a comparison of Chaffee’s axial fan 86 and Wu’s centrifugal fan 15.” Pet.

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Reply 11 (citing Ex. 1625 ¶¶ 39, 40).¹⁹ According to Petitioner, “Dr. Stevick agrees that centrifugal fan pumps (like Wu’s centrifugal fan 15) are ‘typically’ preferred over axial fan pumps (like Chaffee’s axial fan 86) due to efficiency gains virtually identical to those described in Scott’s ‘efficiency statements.’” *Id.* at 11–12 (citing, *inter alia*, Ex. 1634, 153:19–153:25 (testifying that an axial fan pump is typically not as “efficient” as a centrifugal fan pump)).

On the complete record here, we are persuaded by Petitioner’s argument that one of skill in the art would view the relied-upon passage in Scott—column 1, lines 54–56 (*see* Pet. 44–45)—as at least suggesting to one of ordinary skill in the art that modifying Chaffee’s reversible pump assembly to a unidirectional pump assembly would realize certain energy efficiency advantages. Pet. 44–45. As an initial matter, Patent Owner’s argument, summarized above, does not actually address the passage from Scott relied on by Petitioner for the energy efficiency rationale. Patent Owner incorrectly asserts that Petitioner relies on column 1, lines 40–45 of Scott to support the energy efficiency rationale (PO Resp. 37–38), but Petitioner actually relies on column 1, lines 54–56 of Scott for that rationale (Pet. 44–45). Because Patent Owner’s argument focuses on a passage not relied on by Petitioner as to the energy efficiency rationale, we find it unpersuasive.

We turn now to the testimony of Patent Owner’s declarant. In support of Patent Owner’s argument, Dr. Stevick stated that “[i]t is a gross

¹⁹ Petitioner uses the term “Scott’s ‘efficiency statements’” to refer to a broader disclosure in Scott than Patent Owner, specifically column 1, lines 37–56. *See* Pet. Reply 11, n.3.

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overgeneralization to apply Scott’s Efficiency Statement to pumps of different types, because that would imply a one-directional pump of one type is always more efficient and compact than a reversible pump of a different type.” Ex. 2429 ¶ 99, *cited at* PO Resp. 37. Based on that, Dr. Stevick states that one of ordinary skill in the art “would appreciate that it is inappropriate to apply Scott’s Efficiency Statement to compare the pumps of Chaffee and Wu because they are different types of fan pumps.” Ex. 2429 ¶ 99, *cited at* PO Resp. 37.

As noted by Petitioner, Dr. Stevick acknowledged during his deposition that “[t]ypically” a “centrifugal fan that can be optimized for its one-way flow . . . is more efficient than the axial fan that has to have flow in two directions.” Ex. 1634, 153:19–153:25, *discussed at* Pet. Reply 11–12. Patent Owner’s argument that Dr. Stevick’s “admission” does not support Petitioner’s *alternative* rationales—e.g., that using a “uni-directional pump assembly is cheaper and/or smaller”—does not undermine the energy efficiency rationale. *See* PO Sur-reply 10. For these reasons, we are persuaded by Petitioner’s argument that “Dr. Stevick’s testimony directly undermines [Patent Owner’s] argument that Scott’s ‘efficiency statements’ would not apply ‘to compare the pumps of Chaffee and Wu because they are different types of fan pumps.’” Pet. Reply 12 (quoting PO Resp. 36–37) (citing Ex. 1625 ¶ 40).

Moreover, we are not persuaded by Patent Owner’s argument that “Scott’s Efficiency Statement applies to cases where the pumping air pressure and volume flow are designed to be the same in the forward and reverse directions.” PO Resp. 38. According to Patent Owner, although “that may be beneficial for some applications, it is not necessary that the

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forward and reverse air pressure and volume flow are the same for reversible pumps connected to air mattresses.” *Id.* Thus, Patent Owner argues, “Scott provides no motivation to convert a reversible pump design to a one-directional pump design in applications where the inflation and deflation rates can be different, such as in Chaffee’s inflatable air mattress.” *Id.* at 38–39 (citing Ex. 2429 ¶ 101).

We are persuaded by Petitioner’s argument that this argument by Patent Owner is unsupported. Pet. Reply 18. Here, Patent Owner does not provide adequate evidentiary basis for this understanding of Scott. Although Patent Owner cites to paragraph 101 of Dr. Stevick’s declaration, Dr. Stevick merely repeats Patent Owner’s argument (nearly word-for-word) with no additional analysis, facts, or data. *Compare* Ex. 2429 ¶ 101, *with* PO Resp. 38–39; 37 C.F.R. § 42.65(a). In addition, this argument again addresses a different passage in Scott than was relied on by Petitioner as to the energy efficiency rationale at issue.

Maintaining “Chaffee’s Housing-Contained Design”

We turn now to the second aspect of Petitioner’s proposed modification. According to Petitioner, “in converting Chaffee’s Reversible Pump Assembly in view of Wu, [one of ordinary skill in the art] would have maintained Chaffee’s Housing-contained design . . . , such that the movable air conduit (e.g., Wu’s rotary valve 100) and the fan and motor (e.g., Wu’s blower 15) was disposed inside Chaffee’s Housing.” Pet. 48 (citing Ex. 1402 ¶¶ 205–208). Petitioner provides several reasons to maintain Chaffee’s Housing-contained design, including: (1) “compactness” (Pet. 49 (citing Ex. 1402 ¶ 206; Ex. 1432, Abstract)); (2) “durability” (*id.* (citing Ex. 1402 ¶ 207; Ex. 1406, 4:20)); and (3) “decreased manufacturing costs”

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(*id.* (citing Ex. 1402 ¶ 208)). Petitioner also contends that “maintaining this Housing-contained design would have been a well-known option to [one of ordinary skill in the art] that yielded predictable results, as housing contained Uni-directional Pump Assemblies were well-known.” *Id.* (citing Ex. 1402 ¶ 209; Exs. 1410, 1430, 1431, 1437, 1445).

For the reasons discussed below, we determine that the record here supports Petitioner’s assertion that one of ordinary skill in the art would have maintained Chaffee’s Housing-contained design at least for durability. *See* Pet. 48–49 (citing Ex. 1402 ¶ 207; Ex. 1406, 4:20). As noted by Petitioner, the cited passage in Chaffee teaches that a housing may serve “to protect the inner workings of the pump.” Ex. 1406, 4:20. This reasoning is supported by the testimony of Dr. Beaman, who discusses how “durability . . . is one of the five key design factors [one of ordinary skill in the art] would have considered.” Ex. 1402 ¶ 207 (emphasis omitted).

As to the durability rationale, Patent Owner first argues that “[b]uilt-in designs can . . . add heat to the material, resulting in faster aging and potential breakdown of the material.” PO Resp. 49–50 (citing Ex. 2429 ¶ 123). Patent Owner states that “Wu noted an overheating issue in existing systems and existing systems and one of the objects of Wu’s invention is to provide a system that will not overheat.” *Id.* at 48 (citing Ex. 1405, 1:35–39, 2:14–15, 3:8–11; Ex. 1466, 2:7–9, 3:11–12, 4:25–28).

Patent Owner has not adequately explained, or identified adequate evidentiary support for, why *maintaining* Chaffee’s Housing-contained design would result in overheating. Specifically, we are not persuaded by Patent Owner’s arguments that rely on Dr. Stevick’s testimony that (1) one of ordinary skill in the art “would appreciate that if the blower was enclosed

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in a confined space, the resulting design *might need* an additional cooling apparatus” (Ex. 2429 ¶ 121, *cited at* PO Resp. 48–49 (emphasis added)) and that (2) “[b]uilt-in designs *can also* add heat to the material, resulting in faster aging and potential breakdown of the material” (Ex. 2429 ¶ 123, *cited at* PO Resp. 49–50 (emphasis added)).

As an initial matter, the speculative nature of these statements is evident from the words shown in italics. Pet. Reply 21 (arguing the “speculative nature” of the statement in Ex. 2429 ¶ 121). Moreover, for support on this issue, Dr. Stevick and Patent Owner cite the following statement from the Background of the Invention section of Wu: “Another object of the present invention is to provide an air mattress air supply and control system having a fan and motor that will not over heat as is now the case with many existing systems.” Ex. 1405, 1:35–38, *cited at* PO Resp. 48 & Ex. 2429 ¶ 121. We are persuaded by Petitioner’s argument that Patent Owner’s “reliance on Wu’s reference to overheating is misplaced.” Pet. Reply 21 n.4 (citing Ex. 1625 ¶¶ 61–62). As noted by Petitioner and discussed by Dr. Beaman, this statement was not addressing a Housing-contained design (as in the modified device) at all, but rather addressing continuously operating pumps (which the proposed modified device is not). *See* Pet. Reply 18 (citing Ex. 1625 ¶¶ 61–62); Ex. 1625 ¶ 61 (“Wu is describing an overheating issue with continuously operating air supply systems for low air loss inflatable mattresses. (Ex. 1405, 1:27–54.) Obviously, this is not how the modified Chaffee device would be used, as it need only operate for small periods of time, not continuously.”).

Moreover, to the extent Patent Owner contends that *all* Housing-contained designs have overheating issues, that draws into question how the

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applicant in the '394 patent overcame such a common problem when this issue is not discussed in the '394 patent. *See Smith & Nephew, Inc. v. Rea*, 721 F.3d 1371, 1381–82 (Fed. Cir. 2013) (addressing a patent owner's argument as to an alleged technical issue in the proposed combination, stating that “[t]his naturally raises the question of how [patent owner] managed to make such a combination work”), *cited at* Pet. Reply 21.

As to the second argument addressing this aspect of the proposed modification, Patent Owner contends that “[a] housing containing the components of Wu’s blower, rotary valve and any control hardware would be relatively heavy and likely to damage the walls of an inflatable device.” PO Resp. 49–50 (citing Ex. 2429 ¶ 123).

Patent Owner has not identified evidentiary support for the contention that maintaining a Housing-contained design would damage the walls of the modified device. For example, the relied-upon testimony of Dr. Stevick essentially repeats Patent Owner’s argument with no additional analysis, facts, or data. *Compare* Ex. 2429 ¶ 123, *with* PO Resp. 49–50; 37 C.F.R. § 42.65(a). Moreover, as argued by Petitioner (Pet. Reply 10–11), this argument seems to be based on an improper bodily incorporation theory involving the physical incorporation of Wu’s structures into Chaffee. *Mouttet*, 686 F.3d at 1332 (“It is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements.”).

Additional Asserted Reasons to Modify Wu with Chaffee

We have reviewed Petitioner’s additional asserted reasons for the two aspects of the proposed modification of Chaffee based on Wu (which are

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argued in the alternative), and we determine that those reasons are not as strongly supported by the record as the reasons discussed above.

Patent Owner's Additional Arguments

In addition to the arguments discussed above, which specifically address one of Petitioner's rationales for each of the two aspects of the proposed modification, Patent Owner provides other arguments explaining why one of ordinary skill in the art would not have modified Chaffee based on Wu. We address each of those arguments in turn below.

First, Patent Owner argues that Petitioner ignores Wu's teachings of a closed loop air system. PO Resp. 32–35. Specifically, Patent Owner argues that one of ordinary skill in the art “would appreciate that Wu teaches a closed loop air flow control system and that the control components of Wu are an important part of the operation of system 10 because they provide a control signal for blower 15 used for closed-loop control of air flow to an air mattress.” *Id.* at 33–34 (citing Ex. 2429 ¶ 92). According to Patent Owner, “when Petitioner[] refer[s] to the ‘Uni-directional Pump Assembly’ of Wu, [it] refer[s] only to blower 15 and rotary valve 100 of Wu's entire air control system and ignore[s] the controls on the system.” *Id.* at 34.

Patent Owner's arguments do not demonstrate a deficiency in the asserted rationale. Instead, we are persuaded by Petitioner's argument that Patent Owner's “position is inconsistent with Wu's teachings about the purpose of the control network.” Pet. Reply 15 (citing Ex. 1625 ¶¶ 47–48). As argued by Petitioner, “Wu teaches that the purpose of its control network is to ‘control the patient, mattress interface pressure to prevent the formation of bed sores’ through the use of ‘an algorithm.’” *Id.* (quoting Ex. 1405, 4:3–5, 4:15–23) (citing Ex. 1625 ¶ 48). We are persuaded by Petitioner's

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argument that “[s]uch a control network is simply unnecessary in Chaffee’s ordinary consumer inflatable mattress application.” *Id.* (citing Ex. 1625 ¶¶ 48–49; Ex. 1635, 436:1–5 (Dr. Stevick testifying that one of ordinary skill in the art could use less than all of Wu’s system); Ex. 1405, 3:18–22, 6:53–58).

In the Sur-reply, Patent Owner cites pages 47–49 of its Response for the proposition that “control elements are required to control Wu’s blower.” PO Sur-reply 13. Although page 49 of the Response references allegedly “necessary control network components” of Wu, Patent Owner does not, in the Response or Sur-reply, adequately explain *why* any part of Wu’s control network would be *required* in the context of the proposed modified device.

Second, Patent Owner argues that one of ordinary skill in the art viewing Wu for what it teaches would not have modified Chaffee based on Wu. PO Resp. 51–55. Specifically, Patent Owner argues that one of ordinary skill in the art would have understood that “Wu uses a centrifugal fan type blower to provide ample pressure and air flow for an air mattress requiring constantly circulating air which may experience relatively high variations in air flow during use,” whereas one of ordinary skill in the art “would appreciate that the air mattress of Chaffee requires substantially no air flow after the mattress is inflated, and so it does not require constantly circulating air and does not experience high variations in air flow or air pressure during use.” *Id.* at 52 (discussing Ex. 2429 ¶¶ 127–129).

According to Patent Owner, one of ordinary skill in the art “would not look to Wu because it represents a much more complex flowing air system and would require at least a minimal control aspect to avoid overinflation and

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overheating if attempted to be substituted for Chaffee’s reversible motor.”
Id. (citing Ex. 2429 ¶ 130).

Patent Owner’s arguments do not demonstrate a deficiency in Petitioner’s proposed modification. As an initial matter, for reasons discussed above, Patent Owner has not established that any of the control network of Wu would be necessary in the context of the modified device. Moreover, Patent Owner has not adequately explained why the alleged *differences* between Chaffee and Wu identified by Patent Owner undermine the rationale provided by Petitioner. *See KSR*, 550 U.S. at 420 (“[F]amiliar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.”). Here, the cited testimony of Dr. Stevick does not support Patent Owner’s position, as it essentially repeats Patent Owner’s argument with no additional analysis, facts, or data. *Compare* Ex. 2429 ¶¶ 127–130, *with* PO Resp. 51–52; 37 C.F.R. § 42.65(a).

Patent Owner also contends that one of ordinary skill in the art “would understand that to safely inflate a mattress the amount of power delivered to the blower 15 should be controlled using a control device, such as control unit 50 and control line 53” in Wu, and that “[u]se of Wu’s blower without the proper controls could result in a system that could produce enough air pressure and air flow to overinflate the inflatable body or other air components, and the resulting system would therefore be unsafe.” PO Resp. 53 (citing Ex. 1405, 2:54–55, 3:34–47, 4:56–67; Ex. 1466, 4:11–12, 5:13–21, 5:26–6:5) (referencing Ex. 2429 ¶ 131). Patent Owner also asserts that one of ordinary skill in the art would “appreciate that Chaffee *teaches away* from air systems like Wu, because Chaffee specifies relatively low pressure

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operation in a limited range of pressures.” *Id.* (citing Ex. 1406, 4:4–10). According to Patent Owner, one of ordinary skill in the art would understand (1) “that to use the variable speed blower of Wu, a control system would be required to control the blower power and the resulting air pressure applied to a mattress per Chaffee 4:5–10” and (2) “that the Wu blower without the Wu control system would not provide air pressure within a desired pressure range and might provide substantially more pressure than is needed or safe.” *Id.* at 54 (citing Ex. 2429 ¶¶ 132, 133).

This argument does not demonstrate a deficiency in Petitioner’s asserted rationale. The cited portions of Wu and the Wu provisional application (Ex. 1466) show that Wu (and its provisional) disclose the use of a control network, but do not support Patent Owner’s position that, if blower 15 and valve 100 are used *without* a control network, the system would necessarily overinflate an inflatable body or be rendered unsafe. Here, as noted by Petitioner, in contrast to the operation of the device in Wu, the modified device “need only operate for small periods of time, not continuously.” Pet. Reply 18 (citing Ex. 1625 ¶¶ 61, 62, 64; Ex. 1635, 436:1–19); *see also* Tr. 92:6–9 (counsel for Patent Owner agreeing that Chaffee does not run continuously). Moreover the cited testimony of Dr. Stevick does not support Patent Owner’s position, as it essentially repeats Patent Owner’s argument with no additional analysis, facts, or data. *Compare* Ex. 2429 ¶¶ 131–133, *with* PO Resp. 53–54; 37 C.F.R. § 42.65(a).

This argument also seems to be based on an improper bodily incorporation theory involving the physical incorporation of Wu’s structures into Chaffee, as noted by Petitioner. Pet. Reply 10–11; *see also Mouttet*, 686 F.3d at 1332 (“It is well-established that a determination of obviousness

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based on teachings from multiple references does not require an actual, physical substitution of elements.”).

In addition, Patent Owner has not shown that the alleged differences between Chaffee and Wu—e.g., that Chaffee may “specif[y] relatively low pressure operation in a limited range of pressures” (PO Resp. 53)—amount to a teaching away. PO Resp. 53; *see In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (“The prior art’s mere disclosure of more than one alternative does not constitute a teaching away from any of the[] [disclosed] alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed . . .”).

For the reasons above, we determine, in light of the complete record, that Petitioner has shown by a preponderance of the evidence that one of ordinary skill in the art at the time of the invention would have been motivated to modify Chaffee based on Wu, as proposed.

(8) *Objective Evidence of Nonobviousness*

We turn next to Patent Owner’s objective evidence of nonobviousness and Petitioner’s rebuttal evidence. Objective evidence of nonobviousness, when present, must always be considered as part of an obviousness inquiry. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012). Notwithstanding what the teachings of the prior art would have suggested to one of ordinary skill in the art at the time of the patent’s invention, the totality of the evidence submitted, including objective evidence of nonobviousness, may lead to a conclusion that one or more of the Challenged Claims would not have been obvious to one of ordinary skill in the art. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Objective evidence may include long-felt but unsolved

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need, failure of others, unexpected results, commercial success, copying, licensing, and praise. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *Leapfrog Enters., Inc. v. Fisher–Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007).

“For objective evidence to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.” *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). A nexus must be demonstrated for all types of objective evidence of nonobviousness. *See id.* (addressing nexus generally); *Rambus Inc. v. Rea*, 731 F.3d 1248, 1256 (Fed. Cir. 2013) (addressing long-felt need); *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012) (addressing copying); *In re Kao*, 639 F.3d 1057, 1069 (Fed. Cir. 2011) (addressing unexpected results); *Muniauction, Inc. v. Thomson Corp.*, 532 F.3d 1318, 1328 (Fed. Cir. 2008) (addressing praise); *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996) (addressing commercial success). The stronger the showing of nexus, the greater the weight accorded the objective evidence of nonobviousness. *See GPAC Inc.*, 57 F.3d at 1580 (“To the extent that the patentee demonstrates the required nexus, his objective evidence of nonobviousness will be accorded more or less weight.”); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 306 (Fed. Cir. 1985). Conversely, the weaker the showing of nexus, the less weight accorded the objective evidence of nonobviousness.

“[T]here is a presumption of nexus for objective considerations when the patentee shows that the asserted objective evidence is tied to a specific product and that product ‘is the invention disclosed and claimed in the patent.’” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1329 (Fed. Cir. 2016)

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(internal citation omitted); *see also PPC Broadband, Inc. v. Corning Optical Commc'ns RF, LLC*, 815 F.3d 734, 747 (Fed. Cir. 2016) (“Because the evidence shows that the SignalTight connectors are ‘the invention disclosed and claimed in the patent,’ we presume that any commercial success of these products is due to the patented invention This is true even when the product has additional, unclaimed features.”) (internal citations omitted). Patent Owner produces evidence directed to alleged commercial success, copying, failure to use alternatives, broad acceptance, praise, licensing, long-felt need, and skepticism of others²⁰. PO Resp. 67–75. We address each of these indicia in turn, below, for all of the Challenged Claims. First, however, we address nexus generally.

Nexus

As we explain in greater detail below, based on the complete record, we determine that Patent Owner is entitled to a presumption of nexus with respect to certain Challenged Claims because Patent Owner has “show[n] that the asserted objective evidence is tied to . . . specific product[s] and [those] products ‘[are] the invention disclosed and claimed in the patent.’” *See WBIP, LLC*, 829 F.3d at 1329. This presumption is based solely on the stipulations of infringement by certain competitors, as Patent Owner has failed to provide persuasive evidence that serves as a basis for a nexus for its products or any other competitor products not covered by the stipulation of infringement.

Relying on the testimony of Dr. Stevick, Patent Owner asserts that its products “and competitor products practice the inventive aspects of the ‘394

²⁰ Patent Owner characterizes this indicium of nonobviousness as “against conventional wisdom.” PO Resp. 74.

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[p]atent [c]laims.” PO Resp. 68 (citing Ex. 2429 ¶¶ 155–168, Appx.). First, Patent Owner points out that certain competitors involved in the Texas Litigation admitted that their products infringed some of the Challenged Claims. *Id.*; Ex. 2425, 2–4. Specifically, Patent Owner contends that “Intex and Bestway, the largest makers of airbeds sold in the U.S., admitted their products infringe the ‘394 [p]atent [c]laims.” PO Resp. 68 (citing Ex. 2425).²¹ Second, Patent Owner argues that “Dr. Stevick analyzed the industry and found that in the market electric ‘built-in-pump’ airbeds with power inflation and deflation generally refer to products that practice the ‘394 [p]atent [c]laims.” *Id.* at 68–69 (citing Ex. 2429 ¶¶ 175–230). Patent Owner adds that “Dr. Stevick showed that the design showing secondary considerations specifically aligns with the claims of the ‘394 patent.” *Id.* at 69 (citing Ex. 2429 ¶¶ 222, 241, 280). Third, Patent Owner relies on Dr. Stevick’s testimony that its own products practice the Challenged Claims. *Id.* at 68; *see* Ex. 2429 ¶¶ 179–216, Appx. (containing analysis of Patent Owner’s products against the Challenged Claims).

Petitioner counters that Patent Owner is not entitled to a presumption of nexus in this case. Pet. Reply 26. Petitioner argues that Patent Owner’s declarant failed to fully analyze any of Patent Owner’s products against the Challenged Claims. *Id.* Petitioner adds that it disputed infringement as to several of the Challenged Claims. *Id.* Petitioner also argues that Patent Owner’s nexus position relies on equating use of the phrase “built-in pump” in marketing material with falling within the scope of the Challenged Claims. *Id.* at 26–27.

²¹ We understand Patent Owner to have intended to cite to Exhibit 2425, as no Exhibit “2025” has been filed in this proceeding.

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As to the admission of infringement by certain competitors in the Texas Litigation, products from Airtek, Air Cloud, Air Comfort, AirBedz, Altimair, Pittman, and TexSport admittedly infringe claims 1–5, 7–12, 16–20, 22, and 23 (i.e., most, but not all, of the Challenged Claims) of the '394 patent. Ex. 2425, 2. Products from Intex, Bestway, and Boyd admittedly infringe claims 1–5, 7, 8, 10, and 12 of the '394 patent. *Id.* Because certain of Patent Owner's objective evidence of nonobviousness is directed to these products, Patent Owner's evidence in this regard demonstrates at least some showing of nexus.

We agree with Petitioner's position that Dr. Stevick's testimony fails to provide sufficient support that Patent Owner's products practice any of the Challenged Claims. Pet. Reply 26. Specifically, we are not persuaded by the testimony of Dr. Stevick that:

I have personally reviewed the pumps incorporated in [Patent Owner's] airbed models including the following built-in pumps: EZ V AC Dual Pump and EZ V Auto Shut Off Pump (collectively, "TWW Pumps"). I have determined that each of the TWW Pumps practice at least claims 1, 2, 3, 7, 8, 9, 10, 11, 12, 16, 17, 18, 22 and 23 of the '394 [p]atent [c]laims and claims 4, 5, 6, 19, 20 and 21 to the extent that the PTAB adopts the claim construction of "pipe" asserted by Petitioner[].

Ex. 2429 ¶ 179. Petitioner argues convincingly that Dr. Stevick fails to provide any persuasive support for this opinion covering both of the "TWW Pumps."²² Pet. Reply 26. Based on our review of the complete record, including Dr. Stevick's testimony, we find that Dr. Stevick did not provide

²² Our review of the complete record did not provide us with any additional evidence to support this testimony, such as evidence in the record that packaging is marked with the '394 patent number or appropriate virtual marking. *See* 35 U.S.C. § 287(a).

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support that even one of Patent Owner's products practices any of the Challenged Claims. *Cf.* Tr. 106:15–107:15 (conceding that Dr. Stevick's analyses were not part of the record in this proceeding). Dr. Stevick's analysis purports to compare Patent Owner's Insta-bed product number 840018, which uses the EZ V AC Dual Pump, with the Challenged Claims. *See* Ex. 2429 ¶ 180. Our review of this testimony indicates that Dr. Stevick compared different claim limitations of claim 1 against different pumps. *Compare* Ex. 2429 ¶ 180 (including testimony about EZ V AC Dual pump), *with* ¶¶ 181, 183 (including testimony about EZ V Auto-Shutoff pump), *and with* ¶¶ 182, 184–187 (providing testimony about “each” of the two pumps, relying on what was “shown above,” which was an image of the EZ V Auto-Shutoff pump only). Dr. Stevick does not provide any testimony about the similarities and differences of these two pump models or why his analysis equally applies to both pumps and the Insta-bed product number 840018.

In the remainder of his testimony on how Patent Owner's products allegedly practice the Challenged Claims, Dr. Stevick addresses the limitations of a challenged dependent claim and declares that the TWW Pump models satisfy the limitation without providing any additional information demonstrating *why* either of the two pumps satisfy the limitation. *See* Ex. 2429 ¶¶ 188–215.

In summary, although Dr. Stevick did provide *an* analysis of each Challenged Claim with respect to certain TWW Pumps, we agree with Petitioner that he did not fully analyze *any* of Patent Owner's products. *See* Pet. Reply 26. Accordingly, Patent Owner has not demonstrated that it is entitled to a presumption of nexus based on its own products practicing the Challenged Claims.

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We also agree with Petitioner that Patent Owner is not entitled to a presumption of nexus based on alleged infringement that was disputed or based solely on a product having a “built-in pump.” Pet. Reply 26–27; *see* PO Resp. 68–69. Dr. Stevick testifies that he “personally reviewed airbed models that account for at least the substantial majority of airbeds with electric built-in pumps (‘BIP’) in the marketplace, and they follow the design of [Patent Owner’s] ‘394 [p]atent [c]laims.” Ex. 2429 ¶ 216.

Dr. Stevick’s testimony about the airbeds he “personally reviewed” is entitled to little weight, as he does not provide any of the underlying analyses for his opinion (such as his analyses from the Texas Litigation), including which airbed models he reviewed or how the airbeds practiced any of the Challenged Claims of the ’394 patent. *See* Ex. 2429 ¶¶ 216–218; Tr. 101:18–104:19; 37 C.F.R. § 42.65(a).

Dr. Stevick testifies that “[m]anufacturers and retailers note the importance of a built-in electric pump that inflates and deflates in accordance with the ‘394 patent in their advertising.” Ex. 2429 ¶ 219. To support this opinion, Dr. Stevick references deposition testimony from corporate representatives from Bestway (USA) and Walmart. *Id.* Again, Dr. Stevick’s testimony is not persuasive. We have reviewed the referenced deposition testimony and find that it does not include any statements tying advertising to inflation and deflation as recited in the Challenged Claims. Similarly, as Petitioner argues, Patent Owner, does not provide persuasive evidence that supports his contention that any reference to an electric “built-in pump” that inflates and deflates indicates that the inflatable product practices one or more of the Challenged Claims. *See* Pet. Reply 26–27; Ex. 2429 ¶¶ 219–220.

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In summary, based on the complete record, we determine that Patent Owner is entitled to a presumption of nexus with respect to certain Challenged Claims. This presumption is based solely on the stipulations of infringement by certain competitors in the Texas Litigation, as Patent Owner has failed to provide persuasive evidence that serves as a basis for a nexus for its products or any other competitor products not covered by the stipulation. *See* Ex. 2425, 2–4.

We address Patent Owner’s arguments and evidence and Petitioner’s rebuttal arguments and evidence as to each specific indicium of nonobviousness, below.²³

Commercial Success

Having determined that there is at least some nexus, we consider Patent Owner’s arguments regarding the commercial success of the patented products. Patent Owner contends that “[s]ales of [REDACTED] of

²³ Patent Owner argues that “[t]he party asserting invalidity must overcome the presumption [of nexus] by *clearly and convincingly* proving secondary considerations are unrelated to the patented technology.” PO Resp. 68 (citing *WBIP, LLC*, 829 F.3d at 1329) (emphasis added). Patent Owner’s reliance on *WBIP* for this proposition is misplaced as that case involved district court litigation, where invalidity must be proved by clear and convincing evidence. *WBIP, LLC*, 829 F.3d at 1324; *see, e.g., Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1364 (Fed. Cir. 2018) (“A patent is presumed valid, and the burden of establishing invalidity of a claim rests on the party asserting invalidity by clear and convincing evidence.”). In an *inter partes* review proceeding, however, a petitioner must demonstrate, *by a preponderance of the evidence*, that a challenged claim is *unpatentable*. 35 U.S.C. § 316(e). Patent Owner provides no argument to support its proposition that Petitioner must overcome a presumption of nexus by clear and convincing evidence given the lower burden of proof for unpatentability in an *inter partes* review proceeding as compared to invalidity in a district court.

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dollars of patented products proves ‘overwhelming’ commercial success.” PO Resp. 69 (citing an unpublished decision from the U.S. District Court for the Northern District of Texas). Patent Owner continues that “sales of the patented products by Walmart alone have exceeded [REDACTED].” *Id.* (citing Ex. 2638 ¶¶ 15, 42; Ex. 2429 ¶ 227) (emphasis omitted). Patent Owner contends that “[t]he market for infringing airbeds is a significant portion of the overall airbed market and constitutes most airbed sales by revenue” and that “[t]he industry continues to grow, showing commercial success.” *Id.* (citing Ex. 2638 ¶ 46). Patent Owner argues that “[t]hese airbeds are sold due to the ‘394 patented design.” *Id.* (citing Ex. 2429 ¶¶ 222, 241, 280).

Patent Owner also contends that “Petitioner[’s] and Real-Party-in-Interest Coleman’s own internal research shows” that inflation and deflation times are important to consumers. PO Resp. 69–70 (citing Ex. 2638 ¶¶ 53–58, 61–85; Ex. 2429 ¶¶ 225–228, 239–244, 248, 275–277).²⁴ This research includes online interviews with individuals who have purchased airbeds

²⁴ Patent Owner notes that a protective order in the Texas Litigation was modified to allow “use of protected documents in the ‘pending IPRs—to the extent authorized by the Patent Trial and Appeal Board.’” PO Resp. 70 n.11; *see also* Ex. 2731 (providing the modified protective order). Patent Owner adds that because “the modified district court protective order allows the use of [Texas L]itigation discovery in Patent Owner’s possession to the extent the Board allows, in addition to documents the Board has ordered produced in discovery, Patent Owner’s expert declarations also address [e]xhibits . . . produced in the [Texas L]itigation for the Board’s consideration.” *Id.* Our analysis of Patent Owner’s contentions as to commercial success, including any of the declarants’ analyses that rely on the exhibits listed in footnote 11 of the Patent Owner Response, should in no way be construed as the Board authorizing Patent Owner to use these exhibits. The sole extent of any authorization from the Board to use confidential information from the Texas Litigation is presented in Paper 41.

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within 12 months of the survey. *See, e.g.*, Ex. 2697, 2; Ex. 2698, 2, *cited in* Ex. 2638 ¶¶ 53–54.

Petitioner responds that unclaimed features, such as comfort and durability, contributed to any commercial success. Pet. Reply 27–28. Petitioner contends that these unclaimed features of airbeds are extensively advertised and are consistently rated as more important to customers than a pump. *Id.* (citing Ex. 1649 ¶¶ 9–11, 19–39, ¶¶ 21–22 n.24–27; Ex. 1625 ¶¶ 123–125; Ex. 1650 ¶¶ 8–19).

For example, Petitioner argues that comfort and durability are the most important features of an airbed to customers and that Patent Owner fails to address Petitioner’s evidence that supports its position that unclaimed features are responsible for the commercial success. Pet. Reply 27–28. Petitioner argues that Patent Owner “equate[s] ‘built-in pumps’ with any ‘premium’ products that generate higher revenue and profits, including raised height airbeds.” *Id.* at 28 (citing Ex. 1649 ¶¶ 40–44, 66–69, 72). Petitioner contends that, contrary to this position, “the evidence demonstrates that numerous product features create ‘premium’ airbed products.” *Id.* at 28–29 (citing Ex. 1649 ¶¶ 40–44, 66–69, 72; Ex. 1670, 90–91, 201–202).

Petitioner also argues that Patent Owner did not “address whether market share was impacted when the claimed features were introduced to the market.” Pet. Reply 29 (citing Ex. 1649 ¶ 51). Petitioner argues that Intex’s growth in sales on which Patent Owner relies “is tied directly to Intex’s patented, comfort- and durability-focused Dura-Beam® product line—which is completely unrelated to the Challenged Claims.” *Id.* (citing Ex. 1649 ¶¶ 55–57, Schedules 2–4; Ex. 1650 ¶¶ 8–22; Exs. 1651, 1652, 1654).

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Finally, Petitioner argues that “the vast majority of airbeds purchased by consumers do not have a ‘built-in pump’ (referred to by [Patent Owner] as ‘NBIP’ sales), further demonstrating that a ‘built-in pump’ (whether covered by the Challenged Claims or not) is not important to the majority of consumers.” Pet. Reply 29 (citing Ex. 1649 ¶¶ 45–54, 57).

In reply, Patent Owner argues that “Petitioner[] provide[s] no credible analysis regarding unclaimed features driving commercial success.” PO Sur-reply 24. Patent Owner contends that “other features cannot explain away the success of the ’394 patent” because Dr. “Becker analyzed the patented airbeds against unpatented airbeds and found the other Petitioner-identified features available in both types of airbeds” and thus, “a consumer could obtain them without paying extra for the patented models, but they did” pay extra. *Id.* (citing Ex. 1648, 243:19–245:12). Patent Owner also replies that Petitioner’s arguments concerning market share and units sold are unavailing. *Id.* Patent Owner asserts that Walmart “has sold over [REDACTED] worth of built-in pump airbeds that practice the Challenged [C]laims from April 2011 through August 2018” (*id.* at 21–22 (citing Ex. 2638 ¶ 15; Ex. 1648, 48:16–25; Ex. 2749, 373:19–374:6)) and that “[t]his is not a matter of dispute: it is based on Walmart and Petitioner’s own filed admissions that their products infringe ‘394 patent claims” (*id.* at 22 (citing Ex. 2425, 2–3; Ex. 1648, 69:8–24, 143:4–13) (emphasis omitted)).

Patent Owner shows commercial success of certain airbeds that fall within the scope of some of the Challenged Claims based on the revenues generated by sales of these airbeds. As we explain in greater detail in our analysis below, we find that the nexus between these sales and the claimed

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product features, however, is weak. Accordingly, the overall weight we attribute to the objective evidence of commercial success is not considerable.

First, as we explained above, the presumed nexus is associated with only those products for which Petitioner (and other defendants in the Texas Litigation) admit infringement. Second, based on our review of the complete record, we find that unclaimed features of the sold airbeds contribute, at least in part, to the commercial success of these airbeds, which further weakens the nexus and discounts the overall weight given to this objective evidence. *See* Pet. Reply 27–29. As Petitioner notes, customer survey data, which indicate why a customer purchases an airbed, counter Patent Owner’s contentions. *See id.*; *see, e.g.*, Ex. 2694 (providing research on the purchasing process of airbed customers), *cited at* Pet. Reply 27. For example, customer research shows that [REDACTED]

[REDACTED]

[REDACTED] Ex. 2694, 6; *see also id.* at 7 [REDACTED]

[REDACTED] This research shows that comfort and durability outranks a built-in pump²⁵ in a listing of most important features. *See id.* at 10, 11.

Other record evidence also supports this finding. For example, Coleman customer research shows that, in addition to built-in pumps, which

²⁵ We note that Coleman, the source of this information, disputes that any of its airbeds infringe the ’394 patent and, as we indicate in our analysis of nexus, the evidence of record does not demonstrate that any Coleman airbed falls within the scope of any Challenged Claims. *See* Ex. 2425, 3. Coleman’s use of the term “build in pump” in this survey analysis serves to illustrate that the term is not necessarily an analog for practicing the claims of the ’394 patent.

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were “highly valued” (e.g., [REDACTED])

[REDACTED]

[REDACTED]

[REDACTED] Ex. 2692, 20, 22, 25; *see also* Ex. 2644, 15 (indicating that the most important features are comfort, durability, and not leaking air); Ex. 2696, 8 (indicating that airbed efficacy, including durability and comfort, is more important in brand preference than advanced pump features, including the pump being built into the mattress); Ex. 2697, 20 (indicating that customers would be willing to pay more for durability).²⁶ Our review of the totality of the evidence shows that features related to comfort and durability, as well as the type of pump, are considerations that contribute more significantly to the sales of airbeds at Walmart than a built-in pump.

We recognize that some of the evidence of record supports the position that customers are concerned with inflation or deflation times. *See, e.g.,* Ex. 2692, 25 [REDACTED]. This evidence does not effectively strengthen the nexus between the Challenged Claims and commercial success. Patent Owner does not direct us to persuasive evidence that this customer concern directly translates into a preference for airbeds that are covered by the Challenged Claims. Although a capability to do power inflation and deflation would address this concern, Patent Owner does not direct us to persuasive evidence linking a limitation recited in the ’394 patent to decreased inflation or deflation times as compared to the prior art.

²⁶ These exhibits were cited by declarants’ analyses. *See* Ex. 1649 ¶¶ 21, 25, 27–29, 39, 62, 66; Ex. 2429 ¶¶ 272–274, 277, 278; Ex. 2638 ¶¶ 53, 55.

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As Petitioner argues, Dr. Becker's testimony also supports our finding. Pet. Reply 27–28. For example, Dr. Becker testifies, “I would agree that . . . comfort and durability are important characteristics in consumer demand.” Ex. 1648, 34:19–21. Dr. Becker further testifies that “[e]very manufacturer that I’ve reviewed in describing their products describes a number of different differentiating features of those products, not unlike what” Patent Owner did in terms of comfort and durability. *Id.* at 100:20–101:6. Dr. Stevick testifies consistent with this finding as well. *See* Ex. 1635, 372:3–14 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

We are persuaded by Petitioner's argument that, between 2011 and 2018, Walmart sold more airbeds without built-in pumps as compared to airbeds with built-in pumps supports a finding that, when making an airbed purchase, customers consider factors *other than* whether the airbed has a built-in pump that will power inflate/deflate with a movable air conduit, as claimed in the Challenged Claims. Pet. Reply 29; Ex. 1649 ¶ 52. In this time period, [REDACTED] of airbed sales at Walmart were for airbeds without built-in pumps and sales for airbeds without built-in pumps had similar profit percentages as sales for airbeds with built-in pumps. *See* Ex. 1649 ¶ 52. This [REDACTED], on a per unit basis, supports an inference that customers' purchases are driven, at least in part, by factors other than whether an airbed has a built-in pump with a movable air conduit, as recited in the Challenged Claims.

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Finally, our finding of limited commercial success is consistent with the decision in binding arbitration between Petitioner and Patent Owner involving the '394 patent (and other patents). In that proceeding, the arbitrator, [REDACTED] [REDACTED]

[REDACTED]

[REDACTED] Ex. 2765, 11.

At the same time, we are not persuaded by Petitioner's argument that the increase in sales of Intex airbeds that included built-in pumps was attributable to its introduction of the DURA-BEAM® product line. *See* Pet. Reply 29. Petitioner relies on declaration testimony from Mr. Schoettelkotte (its declarant with respect to economic analyses) and Mr. Slate (Intex's Director of Sales), both of whom reference data from Exhibits 1651 and 1652. *See* Ex. 1649 ¶¶ 55–57; Ex. 1650 ¶ 22. We cannot discern, without additional analysis from Petitioner or its declarants, however, how these data support Petitioner's contention.²⁷

Third, we discount slightly the weight of this objective evidence because Patent Owner's commercial success assertion includes a single retailer—Walmart—without any explanation as to the significance of the sales of this single retailer to the entire market. *See* PO Resp. 69–70. Although Patent Owner contends that infringing airbeds make up “a significant portion of the overall airbed market and constitutes most airbed sales by revenue,” this contention is unsupported. *See id.* at 69 (citing Ex. 2638 ¶ 46). Dr. Becker's declaration, at paragraph 46, likewise

²⁷ At oral hearing, Petitioner presented an analysis of its sales data to support its contention, which showed sales trends. *See* Tr. 155:20–156:7. That analysis, however, does not appear in Petitioner's Reply.

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addresses Walmart sales only, not the “overall airbed market.” *See* Ex. 2638 ¶ 46. As such, although we recognize that the amount of revenue from the Walmart sales is considerable and entitled to some weight, the lack of overall market share data cuts against the Walmart sales data. *See, e.g., Tec Air, Inc. v. Denso Mfg. Michigan Inc.*, 192 F.3d 1353, 1360–61 (Fed. Cir. 1999) (“Based on Tec Air’s sales evidence [of millions of products sold], the jury reasonably could have found that the invention enjoyed commercial success. Denso argues that this evidence is insufficient because Tec Air failed to provide market share data. Although sales figures coupled with market data provide stronger evidence of commercial success, sales figures alone are also evidence of commercial success.”); *cf. In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996) (“This court has noted in the past that evidence related solely to the number of units sold provides a very weak showing of commercial success, if any.”).

We are persuaded, based on the complete record, that there is not a strong nexus between the revenue values for infringing products sold at Walmart and the patented invention. We find that the strength of any nexus is offset by the evidence of record concerning the impact of non-patented features on customer demand. In conclusion, we find that Patent Owner is entitled to some, but not considerable, weight with respect to the objective evidence of commercial success.

Copying

We also consider the fact that a competitor who copies technology suggests it would not have been obvious. *See Windsurfing Int’l, Inc. v. AMF, Inc.*, 782 F.2d 995, 1000 (Fed. Cir. 1986) (“[C]opying the claimed

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invention, rather than one within the public domain, is indicative of non-obviousness.”).

Our [reviewing court’s] case law holds that copying requires evidence of efforts to replicate a specific product, which may be demonstrated through internal company documents, direct evidence such as disassembling a patented prototype, photographing its features, and using the photograph as a blueprint to build a replica, or access to the patented product combined with substantial similarity to the patented product.

Wyers v. Master Lock Co., 616 F.3d 1231, 1246 (Fed. Cir. 2010). Patent Owner contends that, “[a]s admitted by Petitioner[], Bestway, for example, copied the prevalent design for power inflate/deflate airbeds in the market starting in approximately 2010.” PO Resp. 70–71 (citing Ex. 2429 ¶¶ 217, 219, 231, 261). Patent Owner adds that “[t]he products in the market look nothing like the prior art asserted in this IPR—they follow [Patent Owner’s] ’394 patented design.” *Id.* at 71 (citing Ex. 2429 ¶¶ 243–245; Exs. 2682–2686).

We determine that Patent Owner’s evidence of copying is entitled to no weight, as Patent Owner fails to offer any evidence of actual copying. First, Patent Owner does not direct us to any admission by a competitor that it copied one of Patent Owner’s products embodying any of the Challenged Claims of the ’394 patent. *See Wyers*, 616 F.3d at 1246 (“[C]opying requires evidence of efforts to replicate a specific product.”). None of the paragraphs in Dr. Stevick’s declaration highlighted by Patent Owner discusses copying. Indeed, Dr. Stevick does not have a subsection of his declaration directed to copying. *See* Ex. 2429 ¶¶ 169–292 (providing testimony on secondary considerations, but not testifying as to copying). Moreover, Dr. Stevick’s testimony at paragraphs 243–245, cited by Patent

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Owner, is not directed to whether a competitor's products look like the prior art, as Patent Owner indicates. *See* Ex. 2429 ¶¶ 243–245 (discussing alleged commercial success).

Failure to Develop Alternatives

Consideration of objective evidence of nonobviousness also includes “the failure of others to produce alternatives to the patented invention.” *GPAC Inc.*, 57 F.3d at 1580. As with other objective evidence, this evidence must demonstrate that any “inability or unwillingness of competitors” to develop alternative products “is rooted in the subject matter” of the Challenged Claims. *See id.* Patent Owner contends that Petitioner “attempted to design around the ’394 [p]atent but failed—they knew consumers would not accept a design without a permanently built in pump that followed the ’394 [p]atent [c]laims.” PO Resp. 72–73 (citing Ex. 2429 ¶¶ 260–266, Appx.).

In support of this contention, Patent Owner relies on Dr. Stevick's testimony about Intex's 619B and 619C pumps, which Intex developed as alternatives to its admittedly infringing pump. PO Resp. 72–73; Ex. 2429 ¶ 265. Dr. Stevick includes an analysis on how the 619C pump, as part of an airbed, would fall within the scope of claims 1–4, 6–12, 16–19, and 21–23 of the ’394 patent. *See* Ex. 2429, Appx. Dr. Stevick further states that Petitioner did not develop any alternative similar to the products described in the prior art and asserted in this proceeding. *Id.* ¶ 265.²⁸

²⁸ Dr. Stevick also testifies that “[e]ven 17 years after the patent was filed, in the face of litigation with the prospect of damages and possibly an injunction against their products, the market's biggest companies . . . were unable to avoid the patent claims despite three different attempts to develop

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Petitioner responds that it developed noninfringing alternatives to a built-in pump as claimed in the Challenged Claims, and customers immediately purchased the products. Pet. Reply 30. As noted above, however, Dr. Stevick testifies that those alternative designs infringe each of the Challenged Claims and, [REDACTED]

[REDACTED]

[REDACTED] See
Tr. 110:17–111:5; Ex. 2765, 14–16.

Patent Owner also states that “for many years” competitors offered airbeds that fell within the scope of the ’394 patent claims, and would not use alternatives, relying on paragraphs 260–266 of Dr. Stevick’s declaration. PO Resp. 71. Although some of these paragraphs are directed to the litigious nature of the field and an alternative design introduced by Petitioner after being sued for infringement, they do not show that the inability or unwillingness to develop alternatives was rooted in the subject matter of the Challenged Claims. See Ex. 2429 ¶¶ 260–266.

We determine that this objective evidence is entitled to some weight. The record indicates that Petitioner [REDACTED]

[REDACTED]

[REDACTED] See Ex. 2429 ¶ 265, Appx.; Ex. 2765, 14–16. We note, however, contrary to Patent Owner’s assertion, that Patent Owner does not offer any direct evidence that Petitioner “knew consumers would not accept a design without a permanently built in pump.” PO Resp. 72–73. Although

alternatives.” Ex. 2429 ¶ 266. We do not consider this statement at all, as it constitutes argument that should have been included in the Patent Owner Response. See Paper 70, 5.

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Patent Owner's contention is not directly supported, we find, based on our review of the complete record, that Petitioner had an incentive to design around the '394 patent and attempted to do so by making a minimal change to its designs, which supports at least an inference that customers would not have accepted a drastically different design. *See* Ex. 2429 ¶ 265; Ex. 2765, 14–16; *see also* Ex. 2634, Articles 5, 6 [REDACTED]

The significance of this failure is tempered by the fact that the [REDACTED]

[REDACTED] Accordingly, we find that there is limited nexus between this objective evidence and the limitations of the '394 patent.

Broad Acceptance, Praise, and Licensing

Industry acceptance of an invention may also provide an objective indicium of nonobviousness. *See Allen Archery, Inc. v. Browning Mfg. Co.*, 819 F.2d 1087, 1092 (Fed. Cir. 1987) (considering copying, praise, unexpected results, and industry acceptance as indicators of nonobviousness). Also, evidence that the industry praised a claimed invention or a product that embodies the patent claims weighs against an assertion that the same claim would have been obvious. *WBIP, LLC*, 829

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F.3d at 1334. Praise from industry participants, especially competitors, is probative as to nonobviousness because such participants “are not likely to praise an obvious advance over the known art. Thus, if there is evidence of industry praise of the claimed invention in the record, it weighs in favor of the nonobviousness of the claimed invention.” *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1053 (Fed. Cir. 2016). Finally, “[l]icenses taken under the patent in suit may constitute evidence of nonobviousness; however, only little weight can be attributed to such evidence if the patentee does not demonstrate ‘a nexus between the merits of the invention and the licenses of record.’” *GPAC Inc.*, 57 F.3d at 1580 (quoting *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1539 (Fed. Cir. 1983)).

Patent Owner contends that its “patented products launched an entire category of ‘built-in pump’ airbeds.” PO Resp. 73 (citing Ex. 2638 ¶¶ 15, 16, 44–53).²⁹ Patent Owner also contends that “Petitioner[’s] own witnesses testified about the value of the ’394 patented invention, an admission of non-obviousness.” *Id.* (citing Ex. 2638 ¶ 46; Ex. 2429 ¶¶ 241, 248–254, 282, 283). Patent Owner adds that the sales figures show “broad consumer acceptance.” *Id.* (citing Ex. 2638 ¶¶ 15, 42). Patent Owner continues that “[c]ompanies specifically tout the patented technology in their advertisements, including box art and photos highlighting the patented design.” *Id.* (citing Ex. 2429 ¶¶ 219, 242–245; Exs. 2653, 2680–2687). Patent Owner also contends that its “patents in the pending [*inter partes* reviews] including the ’394 patent also have obtained more than [REDACTED]

²⁹ We understand Patent Owner to have intended to cite to Exhibit 2638, as no Exhibit “2639” has been filed in this proceeding.

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dollars in licensing.” *Id.* at 73–74 (citing Ex. 2638 ¶¶ 49–52; Ex. 2429 ¶ 284).

Petitioner responds that Patent Owner “points to no evidence that any licensing or alleged industry praise is the *direct* result of any claimed feature” (emphasis added) (citing Ex. 1649 ¶¶ 61, 73–78) and that “[t]he parties’ settlement agreement should be given no weight” (citing *Bosch Auto. Serv. Sols., LLC v. Matal*, 878 F.3d 1027, 1038 (Fed. Cir. 2017)). Pet. Reply 30.

We find that this objective evidence is entitled to little weight. With respect to Patent Owner’s contention that the invention of the ’394 patent launched an entire category of airbeds, the evidence of record does not support the contention. Although Patent Owner directs us to paragraphs 15, 16, and 44–53 in Dr. Becker’s declaration, we do not discern, and Patent Owner does not adequately explain, how this testimony supports the contention that the ’394 patent launched an entire category of airbeds. *See* PO Resp. 73; Ex. 2638 ¶¶ 15–16 (discussing Walmart products and sales), 44–53 (discussing Walmart sales and licensing).

As to Patent Owner’s contention that Petitioner’s witnesses testified about the value of the ’394 patented invention (PO Resp. 73), we afford this assertion no weight, as it is not supported by record evidence or improperly incorporates by reference argument from a declarant. To support its contention, Patent Owner references a large number of paragraphs from its declarants’ testimony—paragraph 46 of Dr. Becker’s declaration and paragraphs 241, 248–254, 282, and 283 of Dr. Stevick’s declaration—but provides no further explanation. *See* PO Resp. 73 (referencing Ex. 2638 ¶ 46; Ex. 2429 ¶¶ 241, 248–254, 282, 283); Ex. 2638 ¶ 46; Ex. 2429 ¶¶ 241,

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248–254, 282, 283. Based on our review of the referenced evidence, we find that it does not support Patent Owner’s contention.

Patent Owner also contends that “[c]ompanies specifically tout the patented technology in their advertisements, including box art and photos highlighting the patented design,” to support its position that the large sales experienced by their product was due to the patented technology. *See* PO Resp. 73 (citing Ex. 2429 ¶¶ 219, 242–245; Exs. 2653, 2680–2687). The evidence relied on by Patent Owner is directed to the term “built-in pump” generally. Although inflation and deflation are mentioned in some of this evidence, Patent Owner fails to explain adequately how these references are tied to features recited in the Challenged Claims, such as the movable air conduit. Because Patent Owner’s argument is unsupported by the evidence of record, it is not given any weight. PO Resp. 73 (citing Ex. 2429 ¶¶ 219, 242–245; Exs. 2653, 2680–2687).

Patent Owner’s evidence of large sales merely attempts to repackage commercial success as a different indicium of nonobviousness—broad acceptance by consumers. We address commercial success in its own subsection, above.

Finally, we give little weight to the settlement agreement in the context of this indicium. Patent litigation provides risk and uncertainty for a party and settlement represents a way to reduce that risk and uncertainty, independent of any value the parties place on the patented invention. *See Bosch Auto.*, 878 F.3d at 1038 (Fed. Cir. 2017) (“[L]icensing, without more, is generally not a strong indication of nonobviousness if it cannot also be shown that the licensees did so out of respect for the patent rather than to avoid litigation expense.”). Here, Patent Owner fails to explain adequately

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how respect for the Challenged Claims—rather than avoiding litigation’s expense and risk—led to the settlement agreement.

In conclusion, we give the objective evidence associated with the indicia of nonobviousness for broad acceptance, industry praise, and licensing little weight.

Long-felt Need

Evidence of a long-felt but unsolved need tends to show nonobviousness because it is reasonable to infer that the need would have not persisted had the solution been obvious; however, “[a]bsent a showing of long-felt need or the failure of others, the mere passage of time without the claimed invention is not evidence of nonobviousness.” *See Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004).

Patent Owner contends that “[f]or decades the airbed industry sought after goals finally solved by the ’394 patent, *i.e.*, recessed pump, holding air, not overheating, efficiently enabling powered inflation and deflation in a short amount of time without undue size, noise, or expense,” but that no one “created a working, commercially viable product before” the ’394 patent. PO Resp. 74 (citing Ex. 2429 ¶¶ 256–259). Patent Owner adds, without further explanation, that “Petitioner[’s] own asserted motivations to combine are further proof that there was a need, but it was not met until the ’394 patent.” *Id.*

Petitioner responds that Patent Owner’s declarant identifies the alleged long-felt need as “consumer convenience,” which differs from the need identified in the Patent Owner Response and which was satisfied in the prior art. Pet. Reply 30–31 (citing Ex. 1625 ¶¶ 100–106).

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We afford this objective evidence little weight. Patent Owner offers no persuasive evidence of a long-felt need for an inflatable product with a recessed pump that holds air and does not overheat, efficiently enabling powered inflation and deflation in a short amount of time, without undue size, noise, or expense. Our review of the cited paragraphs of Dr. Stevick's testimony reveals that it merely describes prior art systems that differ from the Challenged Claims. *See, e.g.*, Ex. 2429 ¶¶ 256–259. Dr. Stevick's testimony does not direct us to any evidence of Patent Owner's stated long-felt need or that others attempted to satisfy that need and failed. Indeed, as Petitioner points out, Dr. Stevick's testimony seems to be directed to an alleged long-term need for “consumer convenience related to the pump.” *See* Pet. Reply 30; Ex. 2429 ¶ 256 (“[T]here was a long-felt need for consumer convenience related to the pump.”). We are persuaded by Petitioner's argument that Dr. Stevick does not offer any evidence that even this alleged need existed. Pet. Reply 30–31.

For example, Dr. Stevick alleges that “[t]he problem persisted for over 100 years before” Mr. Wang (the named inventor of the '394 patent) solved the problem, but Dr. Stevick's testimony provides no evidentiary support that any problem existed. *See* Ex. 2429 ¶ 257. Although Dr. Stevick testifies that others failed, his testimony does not adequately explain why the previous designs did not provide customer convenience (the problem his testimony is directed to) or that the prior art solutions discussed even attempted to solve the problem of customer convenience. *See id.* Instead, Dr. Stevick's testimony merely recounts the passage of time until the filing of the application that matured into the '394 patent. *See id.*

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In conclusion, we give the objective evidence associated with long-felt need little weight.

Skepticism of Others

“Evidence of industry skepticism weighs in favor of non-obviousness. If industry participants or skilled artisans are skeptical about whether or how a problem could be solved or the workability of the claimed solution, it favors non-obviousness.” *WBIP, LLC*, 829 F.3d at 1335. Patent Owner contends that “[c]onventional wisdom taught away from the ’394 patented design.” PO Resp. 74 (citing Ex. 2429 ¶¶ 285–290). Patent Owner argues that advantages of detachable pumps include that they work with multiple beds, result in smaller deflated beds, have lower costs, have higher efficiencies, and avoid overheating. *Id.* Patent Owner argues that these concerns weigh against a built-in pump design and, despite these concerns, Mr. Wang invented the claimed technology. *Id.*

We afford objective evidence of this indicium very little weight. First, even if we take the asserted disadvantages as true, such statements do not necessarily amount to credible evidence of industry skepticism or rise to the level of teaching away from the Challenged Claims. Moreover, Patent Owner does not direct us to any persuasive evidence that the inflatable product industry was skeptical that a built-in pump with a movable air conduit could effectively be used with an inflatable product, such as an airbed.

Second, we afford Dr. Stevick’s testimony with respect to industry skepticism very little weight. Ex. 2429 ¶¶ 285–287. We find nothing in Dr. Stevick’s testimony in the cited paragraphs that directly addresses industry skepticism or teaching away from the Challenged Claims. Instead, this

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testimony merely identifies differences between the claimed inflatable product of the '394 patent and prior art inflatable products. *See, e.g.,* Ex. 2429 ¶¶ 285–287. Novelty over certain prior art does not equate to industry skepticism or an industry teaching away from a certain solution.

Paragraphs 288 and 289 of Dr. Stevick's testimony allegedly recount conversations between Mr. Wang and his son, a general manager for Patent Owner. As Petitioner persuasively points out, however, we have no documentation of these conversations or any other corroborating evidence and, to the extent that Dr. Stevick accurately characterizes the conversations, the interests of these parties in the outcome of this proceeding causes us to discount their unsworn statements. *See* Pet. Reply 31 (arguing that Patent Owner "relies on uncorroborated, biased conversations its experts had with the named inventor and no other relevant evidence"). In conclusion, we give the objective evidence associated with skepticism of others very little weight.

Summary

Weighing all of the objective evidence, we determine, on the complete record, that Patent Owner is entitled to some, but not considerable, weight in favor of nonobviousness.

(9) Conclusion

For the reasons discussed above (§§ II.C.3.a.1–7), the evidence presented by Petitioner strongly indicates that claim 1 would have been obvious over Chaffee and Wu. For the reasons also discussed above (§ II.C.3.a.8), Patent Owner's objective evidence weighs only slightly in favor of nonobviousness. When considering all of the evidence of obviousness and nonobviousness together (*see In re Cyclobenzaprine*

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Hydrochloride Extended-Release Capsule Patent Litig., 676 F.3d 1063, 1079 (Fed. Cir. 2012)), we find Petitioner’s strong evidence of obviousness outweighs Patent Owner’s objective evidence of nonobviousness. Thus, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claim 1 would have been obvious over Chaffee and Wu.

b. Dependent Claims 2 and 3

Claim 2 depends from claim 1, and recites “wherein air flows from the interior region of the housing into the inflatable body when the air conduit is in the first position.” Ex. 1401, 8:40–42. Claim 3 depends from claim 1, and recites “wherein air flows from the inflatable body into the interior region of the housing when the air conduit is moved to the second position.” *Id.* at 8:43–46. Petitioner states that Chaffee as modified by Wu satisfies the additional limitations in these claims. Pet. 58 (citing Ex. 1402 ¶¶ 227–230).

Referring to a portion of the discussion in the Petition of the “air conduit” limitation, Petitioner states that “when Wu’s gate member 200 (the air conduit) is in the first, inflating position, it directs air into Chaffee’s bladder 20” by “draw[ing] air into the interior region of Chaffee’s Housing (the housing) and then direct[ing] the air to bladder 20 (the inflatable body) through outlet 120.” Pet. 58–59 (citing Ex. 1402 ¶¶ 227–228) (referencing Pet. 49–52). Referring to another portion of the discussion of the “air conduit” limitation, Petitioner states that “when Wu’s gate member 200 is in the second position, it directs air out of Chaffee’s bladder 20, by drawing air into the interior region of Chaffee’s Housing through outlet 120 and then exhausts that air to the atmosphere.” Pet. 59 (citing Ex. 1402 ¶¶ 229–230) (referencing Pet. 53–56).

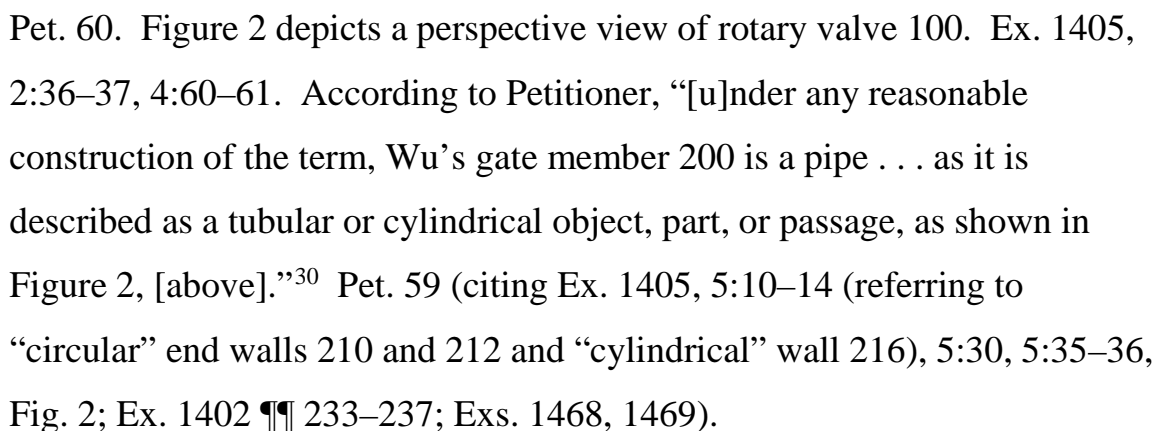
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The record evidence, summarized above, supports Petitioner's position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Wu satisfies the limitations in claims 2 and 3. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claims 2 and 3 would have been obvious based on Chaffee and Wu.

c. Dependent Claims 4–6

Claim 4 depends from claim 1, and recites “wherein the air conduit is a pipe.” Ex. 1401, 8:47–48. Claim 5 depends from claim 4, and recites “wherein the pipe is rotatable.” *Id.* at 8:49–50. Claim 6 depends from claim 4, and recites “wherein the pipe is a switching pipe.” *Id.* at 8:51–52. Petitioner states that Chaffee as modified by Wu satisfies the additional limitations in these claims. Pet. 59 (citing Ex. 1402 ¶¶ 231–244).

As to claim 4, Petitioner refers to the discussion in the Petition of the “air conduit” limitation and states that “Wu's gate member 200 is a movable air conduit.” Pet. 59 (citing Ex. 1402 ¶¶ 232) (referencing Pet. 43–56). Petitioner also provides the following annotated version of Figure 2 of Wu, with orange and blue overlay added to portions of gate member 200.



Although we need not determine the full scope of the term “pipe” in the context of this proceeding, we agree with Petitioner (and the Texas District Court) that the term “pipe” *at least includes* a tubular or cylindrical object, part, or passage. The record evidence, summarized above, supports Petitioner’s position as to the limitation in this claim, which we adopt as our own. We find, based on the complete record, that Petitioner has

³⁰ The Texas District Court construed “pipe” as “a tubular or cylindrical object, part, or passage.” Ex. 1475, 14–16. In the Texas Litigation, Petitioner (and other parties) proposed to construe “pipe” as “a hollow body for conveying air or other gases.” *Id.* at 14.

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demonstrated by a preponderance of the evidence that gate member 200 in Wu falls within that understanding of the term “pipe.”

As to claims 5 and 6, Petitioner states that “Wu’s gate member 200 is also rotatable (Claim 5) and a switching pipe (Claim 6).” Pet. 60 (citing Ex. 1402 ¶¶ 238–244; Ex. 1405, 5:9–10 (describing gate member 200 as “rotat[ing] within valve housing 101”), 6:5 (describing gate member 200 as being “turned” to a specific position), 4:53; Exs. 1468, 1469). “That is,” according to Petitioner, “Wu described gate member 200 (the pipe, Claim 4) as switching, by rotation, between two positions for an inflate mode and a deflate mode (Claims 5 and 6).” Pet. 60.

The record evidence, summarized above, supports Petitioner’s position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Wu satisfies the limitations in claims 4–6. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claims 4–6 would have been obvious based on Chaffee and Wu.

d. Dependent Claim 7

Claim 7 depends from claim 1, and recites “wherein the air conduit is arranged to convey air pumped by the fan and motor assembly.” Ex. 1401, 8:53–55. Petitioner states that Chaffee as modified by Wu satisfies the additional limitation in this claim. Pet. 61 (citing Ex. 1402 ¶ 245). Petitioner refers to the discussions in the Petition of the “air conduit” limitation and the “wherein” limitation, and state that “gate member 200 (the air conduit) conveys air pumped by Wu’s blower 15 (the fan and motor) in

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both the inflate mode and deflate mode.” *Id.* (citing Pet. 43–58; Ex. 1402 ¶ 245; Ex. 1405, 5:44–48, 5:56–6:4, 6:8–16).

The record evidence, summarized above, supports Petitioner’s position as to the limitation in this claim, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Wu satisfies the limitation in claim 7. Patent Owner does not present arguments addressing this claim. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claim 7 would have been obvious based on Chaffee and Wu.

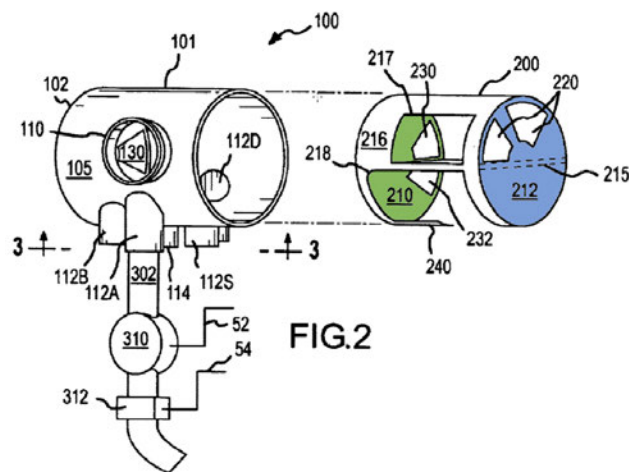
e. Dependent Claims 8 and 9

Claim 8 depends from claim 7, and recites “wherein the air conduit has a first end and a second end, and wherein the fan and motor assembly causes air to be conveyed from the first end of the air conduit to the second end of the air conduit when the air conduit is in the first position.” Ex. 1401, 8:56–60. Claim 9 depends from claim 8, and recites “wherein the fan and motor assembly causes air to be conveyed in sequence from ambient, through the first end of the air conduit, to the second end of the air conduit, and into the inflatable body when the air conduit is in the first position.” *Id.* at 8:61–65. Petitioner states that Chaffee as modified by Wu satisfies the additional limitations in these claims. Pet. 61 (citing Ex. 1402 ¶¶ 246–256).

Petitioner provides the following annotated version of Figure 2 of Wu, with blue overlay added to the identified “first end” and green overlay added to the identified “second end” of gate member 200.

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Pet. 61–62 (citing Ex. 1405, 5:9–14, Fig. 2; Ex. 1402 ¶¶ 246–247). Figure 2 depicts a perspective view of rotary valve 100. Ex. 1405, 2:36–37, 4:60–61. Citing portions of the description of the inflating configuration in Wu as well as portions of the discussion of the “air conduit” limitation in the Petition, Petitioner explains how Chaffee as modified by Wu satisfies the airflow pathways recited in these claims. *See* Pet. 61–63 (citing Ex. 1405, 5:9–14, 5:60–6:4, Fig. 2; Ex. 1402 ¶¶ 246–256; Exs. 1468, 1470; Pet. 49–52).

The record evidence, summarized above, supports Petitioner’s position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Wu satisfies the limitations in claims 8 and 9. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claims 8 and 9 would have been obvious based on Chaffee and Wu.

f. Dependent Claims 10 and 11

Claim 10 depends from claim 8, and recites “wherein the fan and motor assembly causes air to be conveyed from the second end of the air

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conduit to the first end of the air conduit when the air conduit is in the second position.” Ex. 1401, 8:66–9:2. Claim 11 depends from claim 10, and recites “wherein the fan and motor assembly causes air to be conveyed in sequence from the inflatable body, through the second end of the air conduit, to the first end of the air conduit, to ambient when the air conduit is in the second position.” *Id.* at 9:3–7. Petitioner states that Chaffee as modified by Wu satisfies the additional limitations in these claims. Pet. 63 (citing Ex. 1402 ¶¶ 257–266).

Petitioner provides the same annotated version of Figure 2 of Wu shown in the discussion of claims 8 and 9 above. *Compare* Pet. 65, *with id.* at 62. Citing portions of the description of the deflating configuration in Wu as well as portions of the discussion in the Petition of the “air conduit” limitation, Petitioner explains how Chaffee as modified by Wu satisfies the airflow pathways recited in these claims. *See id.* at 63–65 (citing Ex. 1405, 6:10–22, Fig. 2; Ex. 1402 ¶¶ 257–266; Exs. 1469, 1470; Pet. 53–56).

The record evidence, summarized above, supports Petitioner’s position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Wu satisfies the limitations in claims 10 and 11. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claims 10 and 11 would have been obvious based on Chaffee and Wu.

g. Dependent Claim 12

Claim 12 depends from claim 1, and recites “wherein the fan and motor are received in the housing.” Ex. 1401, 9:8–9. Referring to the

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discussion in the Petition of the “air conduit” limitation, Petitioner states that, in the context of the proposed modification, “Wu’s rotary valve 100 and blower 15 (the fan and motor) would be contained in Chaffee’s Housing . . . particularly because Chaffee described the Housing as ‘surround[ing] the inner workings of the pump.’” Pet. 65–66 (quoting Ex. 1406, 4:18–19) (citing Ex. 1406, Fig. 5; Ex. 1402 ¶¶ 267–268) (referencing Pet. 43–56).

The record evidence, summarized above, supports Petitioner’s position as to the limitation in this claim, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Wu satisfies this limitation. Patent Owner does not present arguments addressing this claim. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claim 12 would have been obvious based on Chaffee and Wu.

h. Claims 16–23

For independent claim 16 and claims 17–23, which depend from claim 16, Petitioner references its positions with respect to claims 1–9, 11, and 12. *See* Pet. 66 (citing Ex. 1402 ¶¶ 269–284; Pet. 32–66). For the same reasons discussed above, we find that Chaffee as modified by Wu satisfies the limitations of these claims. Patent Owner does not present arguments addressing these claims aside from the arguments discussed above as to claim 1. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claims 16–23 would have been obvious based on Chaffee and Wu.

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D. Asserted Obviousness of Claims 1–12 and 16–23 Based on Chaffee, Scott, and Pisante

Petitioner asserts that claims 1–12 and 16–23 of the '394 patent are unpatentable under 35 U.S.C. § 103(a) based on Chaffee, Scott, and Pisante. Pet. 23, 67–92; Pet. Reply 23–25. Patent Owner provides arguments specifically addressing this asserted ground of unpatentability. PO Resp. 58–67; PO Sur-Reply 19–21. We begin our analysis with an overview of the asserted prior art and then address the parties' specific contentions. In this ground, Petitioner relies on Scott and Pisante, in addition to Chaffee (summarized above (*see supra* § II.C.1)).³¹

1. Scott

Scott relates “to a vehicle seat assembly having an inflatable bladder in the seat to provide adjustable support for the seat occupant and in particular to an improved air delivery system for inflating and deflating the seat bladder having a single, non-reversible pump for both inflating and deflating the bladder.” Ex. 1412, 1:10–15.

Scott discloses, as part of the background to its invention, that it was known that inflatable bladders for vehicle seats may be deflated by the seat occupant applying pressure to the bladder or by using a pump—either a second pump separate from the pump used to inflate the bladder or a single, reversible pump to inflate and deflate the bladder. *See* Ex. 1412, 1:16–40. Scott discloses that “[t]he two pump system has the added expense of the

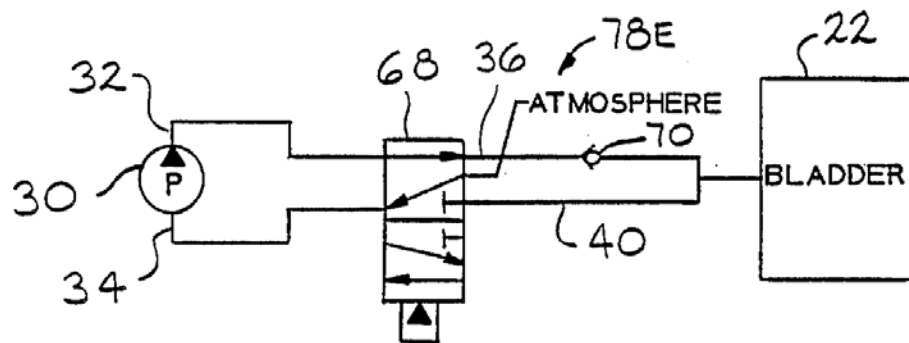
³¹ We understand Petitioner to have intended to state “Chaffee + Scott + Pisante” rather than “Chaffee + Scott + Parienti” in the table summarizing the asserted grounds. Pet. 23. In the context of this ground, Petitioner relies on Pisante for claims 4–6 and 8–11, which depend, directly or indirectly, from claim 1. *See* Pet. 67–92.

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second pump [and a] reversible pump is more expensive than a one-directional pump and is less efficient.” *Id.* at 1:40–43. Scott continues that, because a reversible pump is less efficient than a one-directional pump, “a larger motor is required to produce the same amount of air pressure and volume flow as a one-directional pump.” *Id.* at 1:43–45.

Scott discloses an exemplary one-directional pump for inflating and deflating a bladder in its Figure 12, which we reproduce below.



—FIG. 12

Figure 12 depicts “a pneumatic schematic of a modified form of the air delivery system of” Scott’s invention. Ex. 1412, 2:49–50. Air delivery system 28E³² includes valve 68, which enables pump 30 to both inflate and deflate bladder 22. *See id.* at 5:57–66. As depicted in Figure 12, pump inlet 34 is in communication with the atmosphere through valve 68, and outlet conduit 36 is open through valve 68 to check valve 70 and bladder 22. In this configuration of valve 68, pump 30 would inflate bladder 22. *Id.*, Fig. 12. Check valve 70 prevents air from leaking from the bladder 22 through the valve 68 and pump 30 to atmosphere. *Id.* at 5:53–56. In operation, the

³² Scott’s Figure 12 mistakenly identifies the air delivery system as “78E.” Compare Ex. 1412, Fig. 12, with *id.* at 5:45–6:2; see also Pet. 69 n.9 (noting same mistake).

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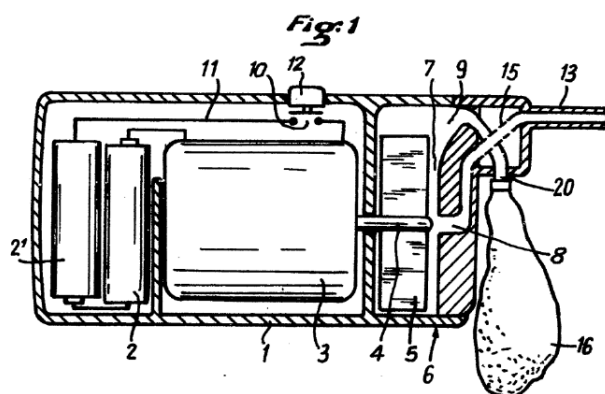
pump 30 pumps air through conduit 36 and the air pressure from the pump opens check valve 70 to allow air to flow into bladder 22. *Id.* at 5:57–60. Air does not leave bladder 22 as conduit 40 is blocked at valve 68, as seen in Figure 12. *Id.* at 5:60–61.

To deflate bladder 22, valve 68 moves to a second position that brings pump inlet 34 into communication with conduit 40 and pump outlet 32 in communication with the atmosphere. Ex. 1412, 5:62–66. In Figure 12, this configuration corresponds to the rectangular representation of valve 68 moving upwards, so that the bottom half of the depicted valve structure aligns with conduit 40 and the line to atmosphere. *See* Ex. 1471 (providing an animation as to Scott's Figure 12).

2. *Pisante*

Pisante relates to a small device in which a one-direction pump can be used, alternatingly, for blowing air or suction. Ex. 1472, 21:5–7.³³

Pisante's Figures 1, 3, and 4 are reproduced below



³³ Exhibit 1472 includes both the original French publication and a certified translation in English. *See, e.g.*, Ex. 1472, 39–40 (providing the translator's declaration). When citing to Pisante, we cite to the page number (and, in some instances, line numbers following a colon) of Exhibit 1472 provided by Petitioner.

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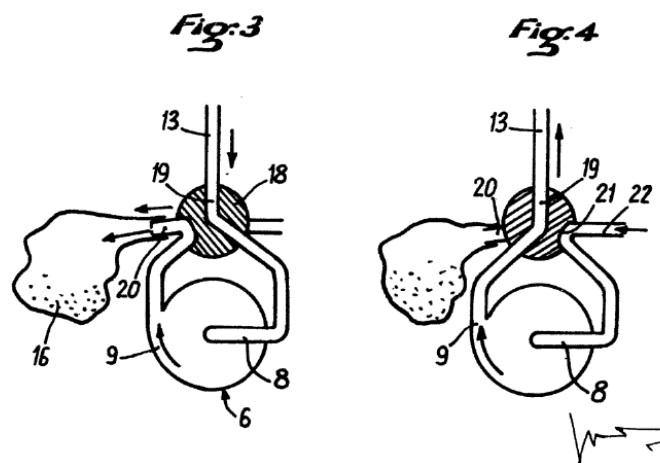


Figure 1 depicts “a cross-sectional view of the device according to” Pisante’s invention. Ex. 1472, 26:28–29. Figure 3 and Figure 4 provide “views of the operation of the three-way ball valve type rotating switching device.” *Id.* at 27:5–6. Pisante’s device includes shell 1 and electric motor 3, with output shaft 4 to drive rotor 5 of blower 6. *Id.* at 27:14–17. The device also includes a switching device, which reverses the flow of air through the device. *Id.* at 27:6–7.

Rotating valve 15, which is manually rotated using chuck 17, includes barrel 18 with inner channel 19. Ex. 1472, 29:5–12. As seen in Figure 3, rotating valve 15 can position inner channel 19 such that air is drawn into blower or turbine 6 through tube 13 and out into envelope 16. *Id.* at 29:12–18. Alternatively, as seen in Figure 4, barrel 18 can position inner channel 19 to conduct air drawn in through inlet 22, through blower 6, and out tube 13. *Id.* at 29:20–29.

3. Analysis

a. Independent Claim 1

Petitioner contend that the combination of Chaffee and Scott (but not Pisante) satisfies each of the limitations of claim 1. Pet. 67–75 (addressing

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claim 1 but not discussing Pisante). To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage with respect to the corresponding claim limitation. *Id.* Petitioner also identifies reasons why one of ordinary skill in the art at the time of the invention would have been motivated to modify Chaffee based on Scott. *Id.* at 68–69, 72. We address in turn below the subject matter of each limitation in claim 1, then Petitioner’s identified reasons to modify Chaffee based on Scott, and then objective evidence of nonobviousness.

(1) The “Inflatable Body” Limitation

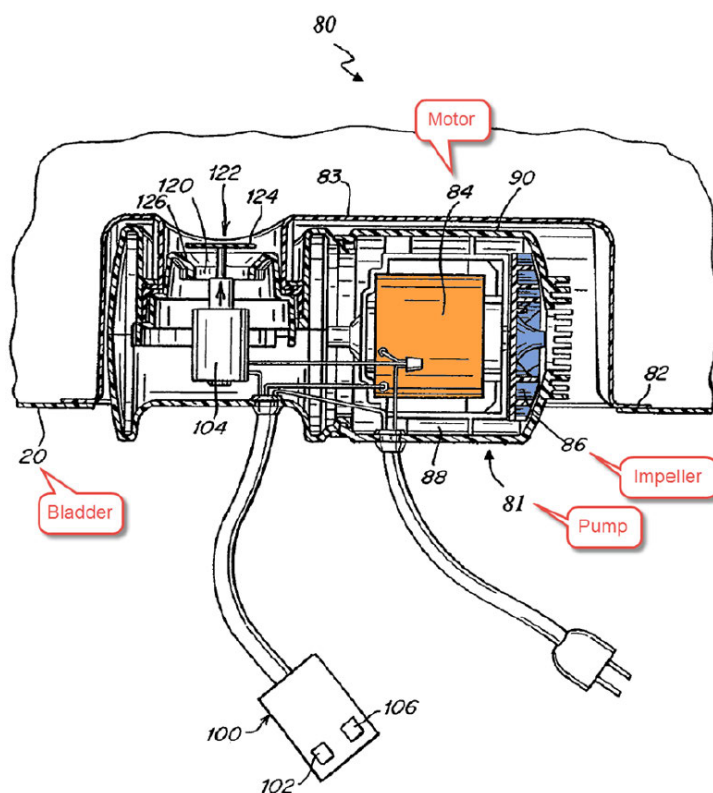
To address the “inflatable body” limitation for this asserted ground, Petitioner again relies on Chaffee and refers to its analysis of this limitation in the prior ground. Pet. 67 (citing, *inter alia*, Pet. 32–33; Ex. 1402 ¶ 292). For the same reasons as above (*see supra* § II.C.3.a.1), we find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee discloses the “inflatable body” limitation. Patent Owner does not present arguments for this limitation.

(2) The “Fan and Motor” Limitation

Referring back to the annotated version of Figure 5 of Chaffee shown below and to the discussion in the Petition of the “fan and motor” limitation in the context of the prior asserted ground, Petitioner states (1) “Chaffee’s pump 81 includes a motor 84 and impeller 86 (a fan and motor)” and (2) “Chaffee described this motor 84 and impeller 86 as being part of a Reversible Pump Assembly.” Pet. 67–68 (citing Ex. 1402 ¶¶ 293, 294; Ex. 1406, 3:62–67, Fig. 5) (referencing Pet. 33–38).

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*Fig. 5*

Pet. 34. Figure 5 depicts a cross-sectional view of one embodiment of fluid controller 80. *See* Ex. 1406, 2:38–39. In the annotated version of Figure 5 above, Petitioner added (1) a text box identifying element 84 as a “Motor,” (2) a text box identifying element 86 as an “Impeller,” (3) a text box identifying element 81 as a “Pump,” (4) a text box identifying element 20 as a “Bladder,” (5) an orange overlay to motor 84, and (6) a blue overlay to impeller 86. Pet. 34.

Petitioner asserts that a person of ordinary skill in the art at the time of the invention “would have been motivated to convert Chaffee’s Reversible Pump Assembly into a Uni-directional Pump Assembly.” Pet. 68. According to Petitioner, one of ordinary skill in the art “would have known how, and would have been motivated, to adapt Chaffee’s motor 84 and

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impeller 86 to take advantage of the favorable characteristics that accompany a Uni-directional Pump Assembly design” for reasons we will discuss below (*see infra* § II.D.3.a.7). Pet. 68 (citing Ex. 1402 ¶ 295) (referencing Pet. 43–56). Petitioner states that “Scott provided a teaching of a Uni-directional Pump Assembly” in that Scott discloses “an air delivery system 28E including a ‘single, one-directional pump’ 30 and ‘two-position, four-way valve 68’ (i.e., a Uni-directional Pump Assembly).” Pet. 69 (citing Ex. 1412, 1:58, 5:49–50; Ex. 1402 ¶¶ 129, 130, 297).

The record evidence, summarized above, supports Petitioner’s position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Scott discloses the subject matter of the “fan and motor” limitation. Patent Owner does not dispute that Chaffee as modified by Scott discloses the subject matter of this limitation.³⁴

(3) *The “Interior Region” Limitation*

To address the “interior region” limitation for this asserted ground, Petitioner again relies on Chaffee and refers to its analysis of this limitation in the prior ground. Pet. 67 (citing, *inter alia*, Pet. 38–40; Ex. 1402 ¶ 292). For the same reasons as above (*see supra* § II.C.3.a.3), we find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee discloses this limitation. Patent Owner does not present arguments for this limitation.

³⁴ We address below Patent Owner’s arguments that one of ordinary skill in the art would not have modified Chaffee based on Scott as proposed. *See infra* § II.D.3.a.7.

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(4) *The “Built Into” Limitation*

To address the “built into” limitation for this asserted ground, Petitioner again relies on Chaffee and refers to its analysis of this limitation in the prior ground. Pet. 67 (citing, *inter alia*, Pet. 40–43; Ex. 1402 ¶ 292). Patent Owner relies on its arguments addressing this limitation in the prior ground. See PO Resp. 66 (arguing that “neither Scott nor Pisante makes up for the deficiencies of Chaffee with respect to” this limitation), 66–67 (citing Ex. 2429 ¶¶ 166–169) (arguing that, “even were it proper to combine the teachings of Chaffee and Scott/Pisante (it is not), that combination would still not result in a device having ‘a housing built into the inflatable body’ as all of the Challenged Claims require”). For the same reasons as above (*see supra* § II.C.3.a.4), we find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee discloses this limitation.

(5) *The “Air Conduit” Limitation*

Petitioner relies on Chaffee as modified by Scott to satisfy this limitation. Pet. 69 (citing Ex. 1402 ¶¶ 296–299).³⁵ Petitioner refers back to the discussion of the “air conduit” limitation in the Petition for the prior asserted ground, and states that one of ordinary skill in the art “would have been motivated to convert Chaffee’s Reversible Pump Assembly into a ‘Uni-directional Pump Assembly’” for reasons we will discuss below (*see infra* § II.D.3.a.7). Pet. 69 (citing Ex. 1402 ¶ 297) (referencing Pet. 43–56). Petitioner states that “Scott provided a teaching of a Uni-directional Pump

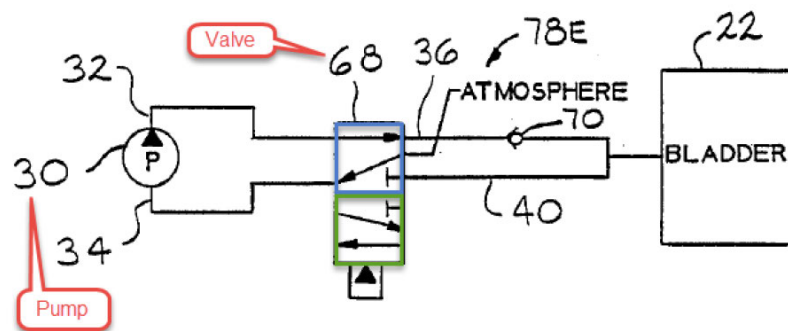
³⁵ Although Petitioner states that “Chaffee, as modified by Wu, disclose[s] this limitation” (Pet. 69), based on the remainder of the discussion (*id.* at 69–75), we understand Petitioner to rely on Chaffee as modified by Scott for this limitation.

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Assembly” in that Scott discloses “an air delivery system 28E including a ‘single, one-directional pump’ 30 and ‘two-position, four-way valve 68’ (i.e., a Uni-directional Pump Assembly).” Pet. 69 (citing Ex. 1412, 1:58, 5:49–50; Ex. 1402 ¶¶ 129, 130, 297).

Petitioner provides the annotated version of Figure 12 of Scott below, and states that, “[i]n valve 68’s first position (outlined in blue), air delivery system 28E ‘inflate[s] bladder 22,’ and, in valve 68’s second position (outlined in green), air delivery system 28E ‘deflate[s] the bladder 22.’” Pet. 69–70 (quoting Ex. 1412, 5:57, 5:62) (citing Ex. 1402 ¶¶ 129–130).



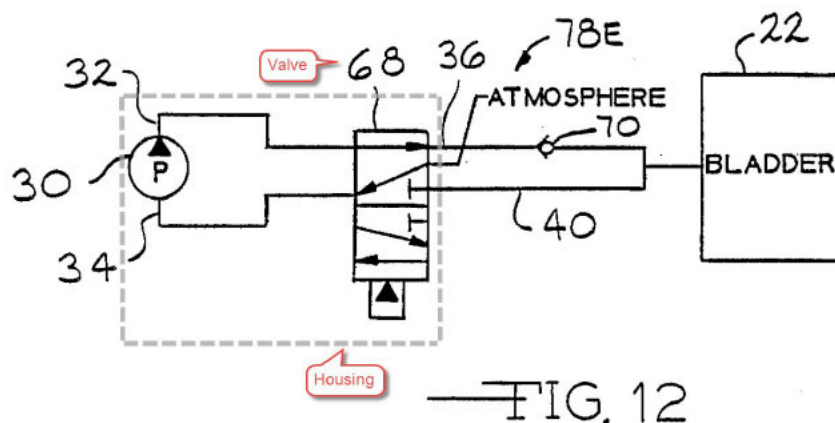
—FIG. 12

Pet. 70. Figure 12 depicts “a pneumatic schematic of a modified form of the air delivery system of” Scott’s invention. Ex. 1412, 2:49–50. In the annotated version of Figure 12, Petitioner added text boxes identifying (1) element 68 as a “Valve” and (2) element 30 as a “Pump” and also added a blue outline and a green outline to the upper and lower portions, respectively, of valve 68. Pet. 70.

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Petitioner also provides the following additional annotated version of Figure 12 of Scott:

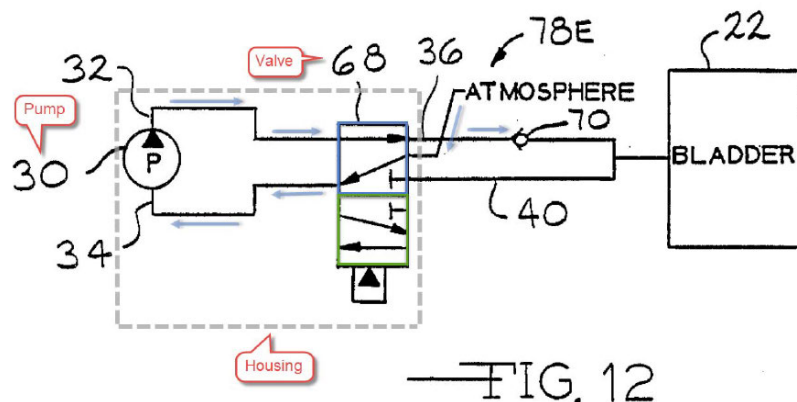


Pet. 72. Figure 12 depicts “a pneumatic schematic of a modified form of the air delivery system of” Scott’s invention. Ex. 1412, 2:49–50. In this annotated version of Figure 12, Petitioner added (1) a text box identifying element 68 as a “Valve” and (2) a gray dotted outline and text box identifying a “Housing.” Pet. 72. According to Petitioner, “[i]n converting Chaffee’s pump 81[]in view of Scott, [one of ordinary skill in the art] would have maintained Chaffee’s Housing-contained design (*see* [Pet. 38–43]), such that the movable air conduit (i.e., such as Scott’s valve 68) was disposed inside Chaffee’s Housing (represented in Scott’s Figure 12, above, in gray)” (Pet. 72 (citing Ex. 1402 ¶¶ 302, 306)) for reasons we will discuss below (*see infra* § II.D.3.a.7). Pet. 72 (citing Ex. 1402 ¶¶ 302, 306) (referencing Pet. 47–49).³⁶

³⁶ With the reference to “Chaffee’s Housing,” we understand Petitioner to again refer to elements 82, 83, and 90, as discussed in the context of the asserted ground of Chaffee and Wu. *See* Pet. 38–40.

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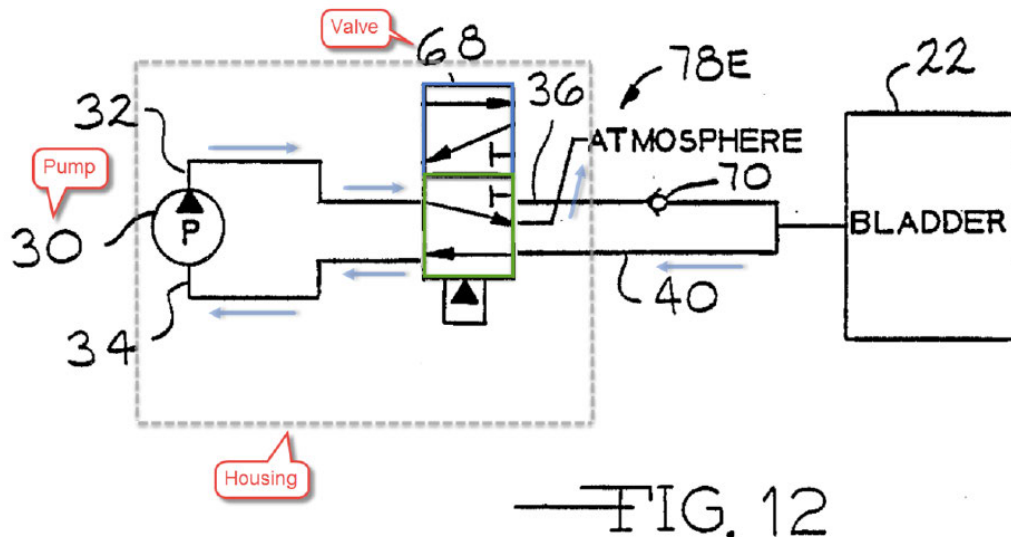
Petitioner also provides the following additional annotated version of Figure 12 of Scott:



Pet. 73. Figure 12 depicts “a pneumatic schematic of a modified form of the air delivery system of” Scott’s invention. Ex. 1412, 2:49–50. In this annotated version of Figure 12, Petitioner added (1) text boxes identifying element 68 as a “Valve” and element 30 as a “Pump,” (2) a blue outline and a green outline to the upper and lower portions, respectively, of valve 68, (3) a gray dotted outline and text box identifying a “Housing,” and (4) blue lines showing the direction of air flow. Pet. 73. Referring to this annotated version of Figure 12, Petitioner states “Scott’s valve 68 is shown ‘in its normal first position [outlined in blue] in which the pump inlet 34 is in communication through valve 68 with atmosphere, and the outlet conduit 36 is open through the valve 68.’” Pet. 73 (quoting Ex. 1412, 5:50–53). According to Petitioner, “[i]n this position, when Chaffee’s fan and motor is actuated ‘air [blue arrows] flow[s] into’ Chaffee’s bladder 20 to inflate it.” Pet. 73 (quoting Ex. 1412, 5:59–60) (citing Ex. 1402 ¶ 305).

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Petitioner also provides the following additional annotated version of Figure 12 of Scott:



Pet. 75. Figure 12 depicts “a pneumatic schematic of a modified form of the air delivery system of” Scott’s invention. Ex. 1412, 2:49–50. In this annotated version of Figure 12, Petitioner added (1) text boxes identifying element 68 as a “Valve” and element 30 as a “Pump,” (2) a blue outline and a green outline to the upper and lower portions, respectively, of valve 68, (3) a gray dotted outline and text box identifying a “Housing,” and (4) blue lines showing the direction of air flow. Pet. 73. Importantly, Petitioner also altered the location of valve 68 with respect to the rest of the structures shown. *Compare* Pet. 75, with Ex. 1412, Fig. 12; *see* Pet. 74 n.11 (explaining this alteration).

Referring to this annotated version of Figure 12, Petitioner states that “valve 68 can be ‘actuated to its second position [outlined in green]’ to ‘deflate’ Chaffee’s bladder 20.” Pet. 74 (quoting Ex. 1412, 5:62–63). According to Petitioner, “[i]n this second position, ‘pump inlet 34 is now in communication with the [bladder 20] through the now open pump inlet

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conduit 40’ and ‘pump outlet 32 is in communication through the valve 68 to atmosphere’ to deflate Chaffee’s bladder 20.” Pet. 74 (quoting Ex. 1412, 5:62–66) (citing Ex. 1402 ¶¶ 309, 310). Petitioner states: “In short, Chaffee, as modified in view of Scott, disclose[s] this limitation, as a movable air conduit (Scott’s valve 68) is disposed at least in part in Chaffee’s Housing (the housing) when the conduit occupies a first position for inflation and a second position for deflation.” Pet. 75 (citing Ex. 1402 ¶¶ 311, 312).

The record evidence, summarized above, supports Petitioner’s position as to this limitation, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Scott discloses the subject matter of the “air conduit” limitation. Patent Owner does not dispute that Chaffee as modified by Scott discloses the subject matter of this limitation.³⁷

(6) *The “Wherein” Limitation*

To address the “wherein” limitation for this asserted ground, Petitioner refers to its analysis of this limitation in the prior ground. Pet. 67 (citing, *inter alia*, Pet. 56–58; Ex. 1402 ¶ 292). For the same reasons as above (*see supra* § II.C.3.a.6), we find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Scott satisfies this limitation. Patent Owner does not present arguments for this limitation.

³⁷ We address below Patent Owner’s arguments that one of ordinary skill in the art would not have modified Chaffee based on Scott as proposed. *See infra* § II.D.3.a.7.

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(7) The Asserted Reasons to Modify Chaffee with Scott

As discussed above, Petitioner presents two different aspects of the proposed modification of Chaffee based on Scott: (1) converting Chaffee’s Reversible Pump Assembly with to a Uni-directional Pump Assembly based on Scott (*see, e.g.,* Pet. 67–69, *discussed supra* §§ II.D.3.a.2, II.D.3.a.5) and (2) maintaining “Chaffee’s Housing-contained design” in the proposed modified device (*see, e.g.,* Pet. 72–73, *discussed supra* § II.D.3.a.5). We discuss these two aspects in turn below.

Converting Chaffee’s Reversible Pump Assembly to a Uni-directional Pump Assembly Based on Scott

According to Petitioner, one of ordinary skill in the art at the time of the invention “would have been motivated to convert Chaffee’s Reversible Pump Assembly into a Uni-directional Pump Assembly” and “would have known how, and would have been motivated, to adapt Chaffee’s motor 84 and impeller 86 to take advantage of the favorable characteristics that accompany a Uni-directional Pump Assembly design” for the same reasons that one of ordinary skill in the art would have used a unidirectional pump assembly in place of the reversible pump assembly in Chaffee discussed in the context of the prior asserted ground—“i.e.,] spatial efficiency, energy efficiency, cost, and weight.” Pet. 68 (citing Pet. 43–56; Ex. 1402 ¶ 295). Petitioner argues that one of ordinary skill in the art “would have known that a Uni-directional Pump Assembly could produce the same amount of volume flow with a smaller, single direction motor by optimizing the blades of the impeller for the single direction of rotation.” *Id.* (citing Ex. 1410, Figs. 23–30, 12:5–21; Ex. 1405, Fig. 1, 2:45–57; Ex. 1412, 1:46–2:2; Ex. 1472, Fig. 1, 7:14–17; Ex. 1474, 9–10; Ex. 1402 ¶ 295). For the reasons

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discussed below, we determine that the record here supports Petitioner’s assertion that one of ordinary skill in the art would have converted Chaffee’s reversible pump assembly to a unidirectional pump assembly at least for increased energy efficiency. *See* Pet. 68–69 (citing Ex. 1402 ¶¶ 295, 297)).

As an initial matter, we provide our understanding of the proposed modification (as also provided in the Decision on Institution). *See* Dec. Inst. 55–56. We agree with Patent Owner that the modified device includes valve 68 of Scott, but we do not agree with Patent Owner that the proposed conversion of “Chaffee’s Reversible Pump Assembly into a Uni-directional Pump Assembly” (Pet. 68) *precedes* incorporating valve 68 from Scott. *Cf.* PO Resp. 59 (“Dr. Beaman’s declaration clarifies that what Petitioner[is] really advocating is that [one of ordinary skill in the art] would have been motivated to **convert** Chaffee’s reversible pump into a uni-directional pump as allegedly suggested by Scott (*see* Beaman Decl., Ex. 1402 at ¶¶293-295, 297) and then incorporate Scott’s control valve 68 into the converted pump assembly to meet the movable air conduit limitations of the Challenged Claims (*see* Beaman Decl., Ex. 1402 at ¶298).” (underlining added)).

Instead, we understand the proposed conversion of “Chaffee’s Reversible Pump Assembly into a Uni-directional Pump Assembly” (Pet. 68) to *include* incorporating valve 68 from Scott. This understanding is supported by the testimony of Dr. Beaman, who states that one of ordinary skill in the art “would have recognized that incorporating a directional control valve, like Scott’s valve 68, into Chaffee’s pump 81 would have allowed for this conversion” and that:

in the conversion, [one of ordinary skill in the art] would have known that Chaffee’s modified motor 84 and impeller 86 assembly would be functionally arranged as shown in the

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schematic of Scott’s Figure 12, below, inside Chaffee’s Housing (represented by gray dashed lines)—that is, Chaffee’s modified motor 84 and impeller 86 would be located, schematically, where Scott’s pump 30 is located schematically.

Ex. 1402 ¶ 298.

We turn now to Patent Owner’s arguments addressing this aspect of the proposed modification. First, Patent Owner argues that “[t]o summarize without separate analysis that [one of ordinary skill in the art] would be motivated to combine Chaffee and Scott (or change the design of Chaffee based on suggestions in Scott) for the same reasons [one of ordinary skill in the art] would be motivated to combine Chaffee with Wu, is the epitome of hindsight reconstruction and improper.” PO Resp. 59–60. Patent Owner states that “if those reasons are to be considered, then for the same reasons set forth [at pages 35–51 of the Patent Owner Response, regarding the asserted ground of] Chaffee and Wu, there would likewise be no motivation to combine Chaffee with Scott.” PO Resp. 60.

Although the discussion of the reasons to modify Chaffee in view of Wu does, in some instances, refer specifically to Wu (*see* Pet. 43–46, 48–49), we view the reasons provided by Petitioner for both aspects of the proposed modification—e.g., increased energy efficiency and durability, respectively—as design considerations that adequately support the similar proposed modifications in the alternative ground here. In the discussion of this issue in the Decision on Institution, we stated: “To the extent Patent Owner views certain *specific* reasons provided by Petitioner[] in the context of the asserted ground based on Chaffee and Wu as inapplicable in the context of the ground based on Chaffee and Scott, Patent Owner should

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specifically address those issues, as appropriate, during trial.” Dec. Inst. 57. To the extent Patent Owner did so, we address those arguments below.

Second, Patent Owner repeats the argument made in the context of prior asserted ground that one of ordinary skill in the art “would appreciate that Scott’s Efficiency Statement . . . is about producing the same amounts of air pressure and volume flow for both directions of a reversible pump, which is not a requirement for reversible pumps connected to air mattresses.” PO Resp. 60 (citing Ex. 2429 ¶ 153) (referencing PO Resp. 38–40 (“Section V.A.3.b.”); *compare* PO Resp. 60–61, *with id.* at 38–39. For the same reasons discussed above (*see supra* pp. 52–53), we are persuaded by Petitioner’s position that this argument by Patent Owner is unsupported. Pet. Reply 18.

Third, Patent Owner contends as “misleading” Petitioner’s statement that one of ordinary skill in the art “would have known that a Unidirectional Pump Assembly could produce the same amount of volume flow with a smaller, single direction motor by optimizing the blades of the impeller for the single direction of rotation.” Pet. 68, *discussed at* PO Resp. 61. Patent Owner states that “it is true that by optimizing the impeller for one direction of rotation a smaller motor could be used to achieve a given air pressure and volume flow,” but asserts that “it is also true that **both** a reversible pump (Chaffee) **and** a one-directional pump (Scott) could achieve the same air pressure and volume flow for inflation using smaller motors.” PO Resp. 62. Patent Owner contends that one of ordinary skill in the art “would appreciate that if one were to choose to optimize inflation or deflation, the [person of ordinary skill] would choose to optimize inflation” and that “Chaffee teaches that its pump design can be optimized in this very fashion, further

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undermining any motivation for [one of ordinary skill in the art] to instead combine it with Scott or Pisante.” *Id.* (citing Ex. 1406, 4:29–36; Ex. 2429 ¶ 157).

Petitioner responds that Patent Owner “does not appear to dispute the benefits that would result from this modification, as [Patent Owner] admits that ‘it is true that by optimizing the impeller for one direction of rotation a smaller motor could be used to achieve a given air pressure and volume flow.’” Pet. Reply 23 (quoting PO Resp. 61–62) (citing Ex. 2429 ¶ 156; Ex. 1625 ¶ 79). Petitioner states: “As Scott teaches, the result is a smaller, more efficient, cheaper, and lighter pump assembly.” *Id.* (citing Ex. 1412, 1:33–56; Ex. 1625 ¶ 79).

We are persuaded by Petitioner’s argument that Patent Owner acknowledges the benefit of converting Chaffee’s reversible pump assembly to a unidirectional pump assembly. This understanding is supported by the testimony of both Dr. Stevick and Dr. Beaman. *See* Ex. 2429 ¶ 156 (repeating Patent Owner’s statement that “it is true that by optimizing the impeller for one direction of rotation a smaller motor could be used to achieve a given air pressure and volume flow”); Ex. 1625 ¶ 79 (“It appears that Dr. Stevick (and Patent Owner) do not dispute the benefits that would result from this modification, as Dr. Stevick (and Patent Owner) admits that ‘it is true that by optimizing the impeller for one direction of rotation a smaller motor could be used to achieve a given air pressure and volume flow.’”).

Patent Owner thus acknowledges the benefit of the proposed modification but argues that one of ordinary skill in the art would have *instead* optimized Chaffee *in another* way. *See* PO Resp. 61–62. The issue,

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however, is not whether one of ordinary skill in the art *could have* optimized Chaffee *without* performing the proposed modification, but rather whether one of ordinary skill in the art *would have* modified Chaffee, as proposed, for the reasons provided by Petitioner. *See KSR*, 550 U.S. at 420 (stating that “any need or problem known in the field of endeavor at the time of the invention and addressed by the patent can provide a reason for combining the elements in the manner claimed”). Moreover, even assuming the “optimized” version of Chaffee discussed by Patent Owner (PO Resp. 62) is superior to the proposed modified device, that “better alternatives” may exist “does not mean that an inferior combination is inapt for obviousness purposes” (*Mouttet*, 686 F.3d at 1334).

Fourth, Patent Owner argues that Scott’s Efficiency Statement does not compare reversible pumps to a “Uni-directional Pump Assembly.” *See* PO Resp. 62–66. Patent Owner argues that “[c]ontrary to Petitioner[’s] repeated assertions, Scott doesn’t suggest substituting a reversible pump for a ‘Uni-directional Pump Assembly.’” *Id.* at 62. According to Patent Owner, “Scott’s Efficiency Statement **compares** a reversible pump to a one-directional pump” and “Scott’s comparison is of a reversible pump to the ‘one-directional air pump 30’ of his disclosure -- not to Petitioner[’s] ‘Uni-directional Pump Assembly.’” *Id.* at 62–63 (citing Ex. 1412, 1:40–45). Patent Owner argues that “Petitioner[], on the other hand, advocate[s] converting Chaffee’s pump 81 to a ‘Uni-directional Pump Assembly’ -- a phrase coined by Petitioner[] to reference the components in the gray box” in the annotated version of Figure 12 of Scott above (*see supra* p. 106). PO Resp. 63 (citing Pet. 69–71). Patent Owner also argues that “Petitioner[’s] proposed combination is really not in accordance with the teachings of Scott

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at all” and that “Petitioner[is] selectively picking the portions of the Scott embodiment they like, and discarding the rest.” *Id.* at 64 (emphasis omitted). For example, Patent Owner argues that “Petitioner[] *exclude[s]* the check valve 70 which, as Scott states, is a necessary component in the system of F[igure] 12,” but Petitioner has “not demonstrated that [its] ‘Uni-directional Pump Assembly’ would work without check valve 70.” *Id.* at 64, 65. According to Patent Owner,

Petitioner[’s] dissection of Scott FIG. 12 and [its] use of coined phrases and self-generated “design” tables bearing no resemblance to the claims or specific prior art (i.e., Table 1 (Petition, p. 21) and Table 2 (Petition, pp. 22-23)) are just a pretense for Petitioner[’s] combination of Chaffee and Scott to perform hindsight reconstruction of the ’394 invention.

Id. at 64–65 (citing Ex. 2429 ¶¶ 160–162).

As an initial matter, for the reasons discussed above (*see supra* pp. 51–53), Patent Owner’s argument focuses on a passage not relied on by Petitioner as to the energy efficiency rationale, we find it unpersuasive. Assuming that Patent Owner addressed a relevant aspect of Scott, however, we address Patent Owner’s argument as to what Scott is comparing in the relevant teachings. We agree with Patent Owner that column 1, lines 40–45 focuses on comparing aspects of a “reversible pump” to a “one-directional pump.” Ex. 1412, 1:40–45. For the energy efficiency rationale, however, Petitioner relies on a different passage in Scott—column 1, lines 54 to 56 (Pet. 44–45). That passage provides: “It is a further advantage of the present invention, that the pump efficiency of a one-directional pump is greater than the efficiency of a reversible pump.” Ex. 1412, 1:54–56. We are persuaded by Petitioner’s argument that the “present invention” referenced in this passage includes valve structures necessary to perform the disclosed

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inflation and deflation. *See* Pet. Reply 24, 19 (citing Ex. 1625 ¶ 57 (“There can be no dispute that Scott’s ‘present invention’ includes a movable air conduit, like valve 68, as this one-directional pump cannot accomplish inflation *and* deflation without this feature.”)); Ex. 1635, 521:9–14 (Dr. Stevick agreeing that Scott’s “air delivery system” includes “the one-directional pump and the valve means”).

Moreover, at least as to energy efficiency, we are persuaded by Petitioner’s argument that “[e]ven if Scott was only referring to motorized pump 30 (i.e., to the exclusion of valve 68),” pump 30 “predominates the . . . energy consumption . . . of a Uni-directional Pump Assembly.” Pet. Reply 17 (citing Ex. 1625 ¶ 60; Ex. 1634, 133:17–134:14). This is supported by the testimony of Dr. Beaman, who states that one of ordinary skill in the art “would have understood the . . . energy consumption . . . of the movable air conduit 68 [in Scott] to be negligible in comparison to motorized pump 30.” Ex. 1625 ¶ 60. Patent Owner does not address these points by Petitioner. *See generally* PO Sur-reply.

We turn now to Patent Owner’s arguments regarding check valve 70 in Scott. *See* PO Resp. 64–65; *see also* Ex. 1412, Fig. 12 (showing check valve 70). Petitioner responds that one of ordinary skill in the art “would understand what is needed to prevent the modified device from leaking, and Scott’s teaching of check valve 70 directly supports this finding.” Pet. Reply 25 (citing Ex. 1625 ¶¶ 82, 83).

Patent Owner’s arguments as to check valve 70 in Scott do not demonstrate a deficiency in this asserted ground. Although Petitioner appears to acknowledge that check valve 70 (or a similar structure) may be necessary in the context of the modified device, as noted by Petitioner, claim

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1 does not recite a check valve (or similar requirement). *See* Tr. 41:12–20. Thus, the fact that Petitioner did not discuss that structure in Scott in the Petition as part of the modified device does not, by itself, undermine the asserted ground of unpatentability based on Chaffee and Scott.

Patent Owner argues that, if check valve 70 *is* included in the modified device, “the combination of references does not enjoy the advantages of reduced cost and spatial efficiency argued by Petitioner[.]” PO Sur-reply 21. Patent Owner does not, however, assert that the inclusion of check valve 70 undermines the *energy efficiency* rationale at issue. Moreover, even assuming that Patent Owner is correct that adding check valve 70 “would make the system more complex and considerably more expensive” (*id.*), a proposed modification with *some* disadvantages “does not necessarily obviate motivation to combine.” *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006).

Finally, Patent Owner’s assertion of “hindsight” does not demonstrate a deficiency in this ground. *See* PO Resp. 65. Rather, Patent Owner’s assertion is essentially a rewording of the argument regarding the alleged lack of a reason to modify, which we addressed above. *See In re Cree, Inc.*, 818 F.3d 694, 702 n.3 (Fed. Cir. 2016) (viewing an argument regarding “impermissible hindsight” as “essentially a repackaging of the argument that there was insufficient evidence of a motivation to combine the references”).

Maintaining “Chaffee’s Housing-Contained Design”

We turn now to the second aspect of Petitioner’s proposed modification in the context of this asserted ground. According to Petitioner, “[i]n converting Chaffee’s pump 81[]in view of Scott, [one of ordinary skill in the art] would have maintained Chaffee’s Housing-contained design (*see*

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[Pet. 38–43]), such that the movable air conduit (i.e., such as Scott’s valve 68) was disposed inside Chaffee’s Housing (represented in Scott’s Figure 12, above, in gray)” (Pet. 72 (citing Ex. 1402 ¶¶ 302, 306)) for the same reasons that one of ordinary skill in the art would have maintained Chaffee’s Housing-contained design in the context of the prior asserted ground (Pet. 72 (citing Ex. 1402 ¶¶ 302, 306) (referencing Pet. 47–49)).

As to this aspect of the proposed modification, Patent Owner relies on the arguments discussed above in the context of the asserted ground of Chaffee and Wu. PO Resp. 65–66 (citing Ex. 2429 ¶ 165) (stating that, “for the same reasons set forth [at pages 35 to 51 of the PO Response], regarding using Chaffee’s housing with Wu, there would likewise be no motivation to use Chaffee’s housing with Scott”); *see supra* § II.C.3.a.7 (“Maintaining ‘Chaffee’s Housing-Contained Design’”).

Although the discussion of the reasons why one of skill in the art would have maintained Chaffee’s Housing-contained design when replacing Chaffee’s reversible pump assembly with Wu’s unidirectional pump assembly does, in some instances, refer specifically to Wu (*see* Pet. 48–49), we view the reasons provided by Petitioner for both aspects of the proposed modification—e.g., increased energy efficiency and durability, respectively—as design considerations that adequately support the similar proposed modifications in the alternative ground here. In the discussion of this issue in the Decision on Institution, we stated: “To the extent Patent Owner views certain *specific* reasons provided by Petitioner[] in the context of the asserted ground based on Chaffee and Wu as inapplicable in the context of the ground based on Chaffee and Scott, Patent Owner should

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specifically address those issues, as appropriate, during trial.” Dec. Inst. 61. Patent Owner did not do so.

For the reasons above, we determine, in light of the complete record, that Petitioner has shown by a preponderance of the evidence that one of ordinary skill in the art at the time of the invention would have been motivated to modify Chaffee based on Scott, as proposed.

(8) Objective Evidence of Nonobviousness

The analysis of Patent Owner’s objective evidence of nonobviousness is the same for this asserted ground as for the prior asserted ground. Thus, for the same reasons discussed above (§ II.C.3.a.8), we determine, on the complete record, that Patent Owner is entitled to some, but not considerable, weight in favor of nonobviousness.

(9) Conclusion

For the reasons discussed above (§§ II.D.3.a.1–7), the evidence presented by Petitioner strongly indicates that claim 1 would have been obvious over Chaffee and Scott. For the reasons also discussed above (§ II.D.3.a.8), Patent Owner’s objective evidence weighs only slightly in favor of nonobviousness. When considering all of the evidence of obviousness and nonobviousness together (*see Cyclobenzaprine*, 676 F.3d at 1079), we find Petitioner’s strong evidence of obviousness outweighs Patent Owner’s objective evidence of nonobviousness. Thus, we conclude Petitioner has demonstrated by a preponderance of the evidence that claim 1 would have been obvious over Chaffee and Scott.

b. Dependent Claims 2 and 3

Petitioner states that Chaffee as modified by Scott satisfies the additional limitations in these claims. Pet. 75–76 (citing Ex. 1402 ¶¶ 313–

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314). Referring to a portion of the discussion in the Petition of the “air conduit” limitation in the context of this asserted ground, Petitioner states that, in the proposed modified device, “air flows from Scott’s valve 68 to Chaffee’s bladder 20 during inflation and from bladder 20 to valve 68 during deflation, and this occurs when that movable conduit is disposed within Chaffee’s Housing.” Pet. 75 (citing Ex. 1402 ¶¶ 313–314; Pet. 69–75). Thus, according to Petitioner, in the modified device, “air flows from the interior region of Chaffee’s Housing into Chaffee’s bladder 20 when Scott’s valve 68 is in the first, inflating position, and from Chaffee’s bladder 20 into the interior region of the housing when Scott’s valve 68 is in the second, deflating position.” Pet. 75–76 (citing Ex. 1402 ¶¶ 313–314; Pet. 69–75).

The record evidence, summarized above, supports Petitioner’s position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Scott satisfies the limitations in claims 2 and 3. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claims 2 and 3 would have been obvious based on Chaffee and Scott.

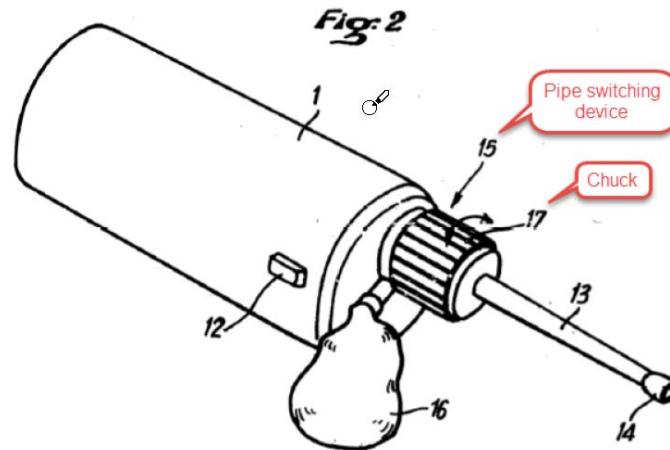
c. Dependent Claims 4–6

Petitioner states that “Chaffee in combination with Scott in further combination with Pisante” satisfies the additional limitations in these claims. Pet. 76 (citing Ex. 1402 ¶ 315). Petitioner states that “Scott’s movable air conduit (valve 68) is only disclosed in schematic form and, as a result, is not a pipe, as required” by these claims. *Id.* (citing Ex. 1472, Fig. 12; Ex. 1402

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¶ 315). As to claim 4, Petitioner provides the following annotated version of Figure 2 of Pisante.



Pet. 78. Figure 2 depicts “a perspective view of an embodiment in which the switching of the paths is undertaken by means of a rotating device.”

Ex. 1472, 27:1–2. In the annotated version of Figure 2 above, Petitioner added (1) a text box identifying element 15 as a “Pipe switching device” and (2) a text box identifying element 17 as a “Chuck.” Pet. 78. Referring to the annotated version of Figure 2, Petitioner states that “Pisante is directed to a ‘device that can alternatingly function as a blower or for suction’” (quoting Ex. 1472, 21:6–7), and that, “[t]o alternate between these two modes of operation, Pisante disclose[s] a directional control valve referred to as a ‘pipe switching device’ (the ‘PSD’) or ‘rotating valve 15’” (citing Ex. 1472, 24:24–25, 29:11; Ex. 1402 ¶¶137, 316). Pet. 78. Petitioner contends that “[b]ecause PSD 15 acts as either a blower or for suction, it conveys air.” *Id.* (citing Ex. 1472, Abstract, 28:21–25, 29:10–29, Figs. 1, 3, 4; Ex. 1402 ¶ 317). Petitioner also asserts that because pipe switching device 15 is “in the form of a tubular or cylindrical object, part, or passage,” “under any reasonable construction of ‘pipe,’ PSD 15 is a pipe.” *Id.* (citing Ex. 1402

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¶¶ 318–319). Petitioner also provides reasons to further modify Chaffee and Scott based on Pisante. Pet. 79–83.

Although we need not determine the full scope of the term “pipe” in the context of this proceeding, we agree with Petitioner (and the Texas District Court) that the term “pipe” *at least includes* a tubular or cylindrical object, part, or passage. The record evidence, summarized above, supports Petitioner’s position as to the limitation in this claim, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that pipe switching device 15 in Pisante falls within that understanding of the term “pipe.”

As to claims 5 and 6, Petitioner states that Pisante’s pipe switching device 15 “is also rotatable (Claim 5) and a switching pipe (Claim 6).” Pet. 78–79 (citing Ex. 1402 ¶¶ 331–336; Ex. 1472, 28:28–29:2 (describing pipe switching device 15 “[a]s of a rotational type” and stating that it “can readily be manipulated by digital rotation”), Abstract, 24:24–28, 25:1–10, 27:5–7, 28:27–29). Petitioner states that “in addition to being referred to as a ‘pipe switching’ device, Pisante described PSD 15 as switching, by rotation, between two positions for a suction mode and a blower mode (Claims 5 and 6).” Pet. 79.

The record evidence, summarized above, supports Petitioner’s position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Scott, and further modified by Pisante, satisfies the limitations in claims 4–6. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance

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of the evidence that claims 4–6 would have been obvious based on Chaffee, Scott, and Pisante.

d. Dependent Claim 7

Petitioner states that Chaffee as modified by Scott satisfies the additional limitation in this claim. Pet. 83 (citing Ex. 1402 ¶ 337). Petitioner argues that Scott’s “valve 68 (the air conduit) conveys air pumped by Chaffee’s modified impeller 86 and motor 84 in both the inflate mode and deflate mode in Chaffee’s converted Uni-directional Pump Assembly.” *Id.* (citing Ex. 1402 ¶ 337).

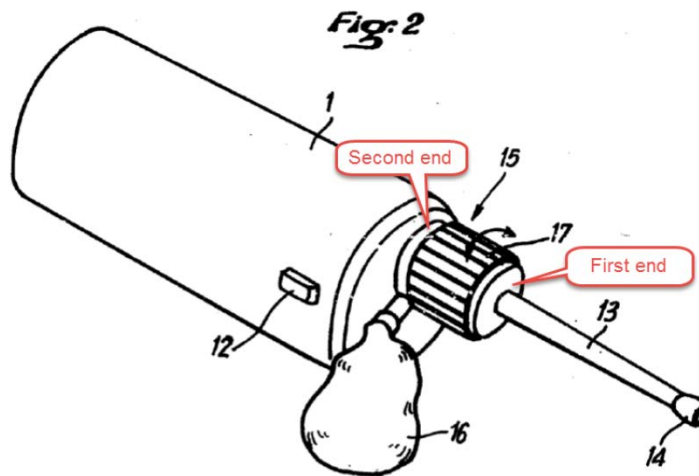
The record evidence, summarized above, supports Petitioner’s position as to the limitation in this claim, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Scott satisfies the limitation in claim 7. Patent Owner does not present arguments addressing this claim. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claim 7 would have been obvious based on Chaffee and Scott.

e. Dependent Claims 8 and 9

Petitioner states that “Chaffee combined with Scott, as modified by Pisante” satisfies the additional limitations in these claims. Pet. 83 (citing Ex. 1402 ¶¶ 338–347). Petitioner provides the following annotated version of Figure 2 of Pisante, which adds text boxes to identify a “Second end” and a “First end” of element 15.

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Pet. 84. Figure 2 depicts “a perspective view of an embodiment in which the switching of the paths is undertaken by means of a rotating device.”

Ex. 1472, 27:1–2. Citing portions of the Chaffee, Scott, and Pisante, Petitioner explains how Chaffee as modified by Scott, and further modified by Pisante, satisfies the airflow pathways recited in these claims. *See* Pet. 83–87 (citing Ex. 1402 ¶¶ 338–347; Ex. 1412, 5:50–60, Fig. 12; Ex. 1472, 28:28–29, 29:12–14, Figs. 1–3 and 12; Ex. 1471) (referencing Pet. 76–83).

The record evidence, summarized above, supports Petitioner’s position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Scott, and further modified by Pisante, satisfies the limitations in claims 8 and 9. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claims 8 and 9 would have been obvious based on Chaffee, Scott, and Pisante.

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f. Dependent Claims 10 and 11

Petitioner states that “Chaffee combined with Scott, as modified by Pisante” satisfies the additional limitations in these claims. Pet. 87 (citing Ex. 1402 ¶¶ 348–354). Citing portions of the Chaffee, Scott, and Pisante, Petitioner explains how Chaffee as modified by Scott, and further modified by Pisante, satisfies the airflow pathways recited in these claims. *See* Pet. 88–90 (citing Ex. 1402 ¶¶ 348–354; Ex. 1412, 5:62–66, Fig. 12; Ex. 1472, 29:20–27, Figs. 1 and 4; Ex. 1471) (referencing Pet. 76–83).

The record evidence, summarized above, supports Petitioner’s position as to the limitations in these claims, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Scott, and further modified by Pisante, satisfies the limitations in claims 10 and 11. Patent Owner does not present arguments addressing these claims. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claims 10 and 11 would have been obvious based on Chaffee, Scott, and Pisante.

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g. Dependent Claim 12

To address claim 12, Petitioner provides the following annotated version of Figure 5 of Chaffee:

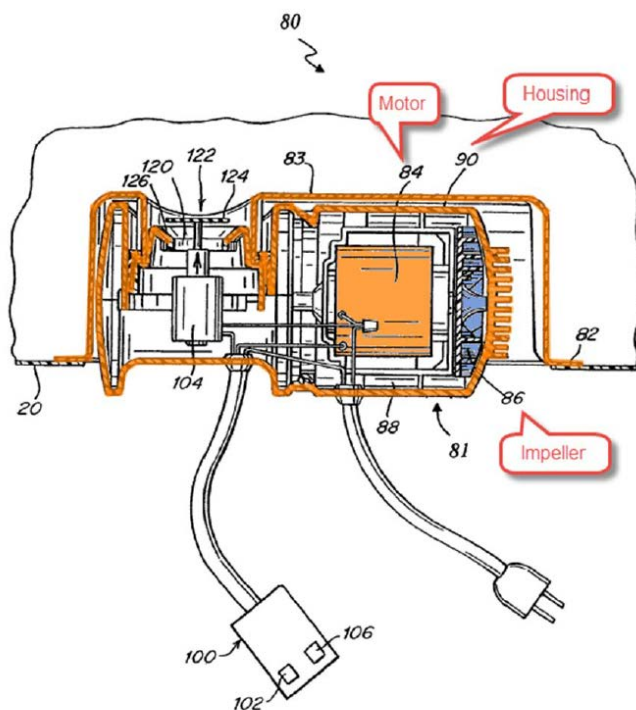


Fig. 5

Pet. 91. Figure 5 depicts a cross-sectional view of one embodiment of fluid controller 80. *See* Ex. 1406, 2:38–39. In the annotated version of Figure 5 above, Petitioner added (1) a text box identifying element 84 as a “Motor,” (2) a text box identifying element 86 as an “Impeller,” (3) a text box identifying element 90 as “Housing,” (4) an orange overlay to the three structural elements making up “Chaffee’s Housing,” (5) an orange overlay to motor 84, and (6) a blue overlay to impeller 86. Pet. 91. Referring to the annotated version of Figure 5, Petitioner states that “Chaffee’s impeller 86 (blue) and motor 84 (orange) (the fan and motor) are received in the Housing

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(orange), which is described as ‘surround[ing] the inner workings of the pump.’” Pet. 91 (quoting Ex. 1406, 4:18–19) (citing Ex. 1402 ¶¶ 354–355).

Although Petitioner only references Chaffee with this discussion of claim 12, we understand Petitioner to rely on Chaffee as modified by Scott to address the additional limitation in this claim. For example, to address the “fan and motor” limitation in claim 1 (from which claim 12 depends directly) in the context of this ground, we understand Petitioner to propose modifying Chaffee based on Scott. *See supra* § II.D.3.a.2.

With that understanding, the record evidence, summarized above, supports Petitioner’s position as to the limitations in this claim, which we adopt as our own. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Chaffee as modified by Scott satisfies this limitation. Patent Owner does not present arguments addressing this claim. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claim 12 would have been obvious based on Chaffee and Scott.

h. Claims 16–23

For independent claim 16 and claims 17–23, which depend from claim 16, Petitioner references its positions with respect to claims 1–9, 11, and 12. *See* Pet. 92 (citing Ex. 1402 ¶¶ 356–357) (referencing Pet. 66, 67–91). For the same reasons discussed above, we find that Chaffee as modified by Scott (as to claims 1–3, 7, and 12) and as further modified by Pisante (as to claims 4–6, 8, 9, and 11) satisfies the limitations of these claims. Patent Owner does not present arguments addressing these claims aside from the arguments discussed above as to claim 1. We determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the

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evidence that claims 16–23 would have been obvious based on Chaffee, Scott, and Pisante.

E. Motions to Exclude Evidence

1. Petitioner’s Motion to Exclude Evidence

Petitioner filed a motion to exclude Exhibits 2030–2033, 2434, 2435, 2443, 2444, and 2775, which Petitioner contends are not cited in the Patent Owner Response, Sur-reply, or any expert declaration. Paper 98, 1.³⁸ Petitioner seeks to exclude this evidence (the “Uncited Exhibits”) as irrelevant under Federal Rules of Evidence Rules 401 and 402. *Id.* Petitioner also argues that certain paragraphs in Exhibit 2429 (Dr. Stevick’s declaration) and Exhibit 2638 (Dr. Becker’s declaration) (collectively, the “Declaration Portions”) should be excluded. *Id.* at 4–7.

a. Uncited Exhibits

With respect to the Uncited Exhibits, Petitioner argues that prior Board decisions provide that exhibits not cited in a patent owner’s papers should be excluded. Paper 98, 1–3.

In opposition, Patent Owner argues that some of the Uncited Exhibits are exhibits to depositions. Paper 100, 4–5. Specifically, Patent Owner argues that Exhibits 2030–2033 are exhibits to Dr. Beaman’s deposition testimony (Exhibits 2040 and 2753). *Id.* at 4–5. Patent Owner adds that Petitioner did not properly object, as it did not object to the evidence during

³⁸ Petitioner’s Motion to Exclude does not include page numbers. We start numbering with page 1 after the cover page.

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the depositions. *Id.* at 4.³⁹ In addition, Patent Owner argues that there is no Exhibit 2775 in this proceeding. *Id.* at 13.

Petitioner replies that Patent Owner addresses only a subset of the exhibits covered in Petitioner's motion. Paper 105, 1 n.1 (identifying Exhibits 2434, 2435, 2443, and 2444 as uncontested by Patent Owner). As to the contested exhibits, Petitioner argues that Patent Owner does not identify where in its papers it relies on Dr. Beaman's testimony directed to any of the exhibits challenged by the motion. *Id.* at 3–4. Petitioner maintains that Patent Owner's argument that Petitioner failed to object at the deposition is nonsensical. *Id.* at 4. Petitioner argues that it could not have known at the time of the deposition that Patent Owner would not rely on those exhibits in its later-filed papers. *Id.*

As to Exhibit 2775, we deny Petitioner's motion. As noted by Patent Owner, that exhibit number was not used in this proceeding. Paper 100, at 13. As to Exhibits 2434, 2435, 2443, and 2444, which are not contested by Patent Owner, we deny Petitioner's motion as moot, as we do not rely on them in this Decision. *See* Patent Trial and Appeal Board, Trial Practice Guide Update, 17 (August 2018) ("Trial Practice Guide 2018 Update"), available at <https://go.usa.gov/xU7GP> ("In the Board's experience, consideration of the objected-to evidence is often unnecessary to resolve the patentability of the challenged claims, and the motion to exclude is moot."); *see also* Office Patent Trial Practice Guide, August 2018 Update, 83 Fed. Reg. 39,989 (Aug. 13, 2018) (notice).

³⁹ Patent Owner does indicate that Exhibit 2030 was objected to at the deposition, but on the basis that it was derived from a different proceeding. Paper 100, 4.

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We also deny Petitioner's motion as to the other Uncited Exhibits (Exhibits 2030–2033). As Patent Owner explains, these exhibits were used in conducting Dr. Beaman's depositions (Ex. 2040 and Ex. 2753) and the complete deposition transcripts are in the record. Although we do not rely on these exhibits in our Decision, we do cite one of Dr. Beaman's depositions. We determine that it is proper to maintain Exhibits 2030–2033 in the record, as they are relevant to testimony in the depositions, even if that testimony is not ultimately relied upon by Patent Owner or Petitioner in this proceeding.

If we followed Petitioner's reasoning, in cases where a deposition or declaration covers multiple, related proceedings, portions of those exhibits would need to be removed to the extent they do not apply to any one proceeding. Similarly, to the extent that a line of questioning in a deposition or testimony in a declaration eventually is not used to support a party's position, that evidence would need to be excluded from the record. Such an approach would make dealing with evidence, particularly evidence entered in multiple proceedings as we have here, cumbersome for the parties to manage. Accordingly, we determine that we will maintain in the record of this proceeding the complete record of Dr. Beaman's depositions, including the associated exhibits.

b. Declaration Portions

With respect to the Declaration Portions, Petitioner argues that this evidence represents arguments that are improperly incorporated by reference by Patent Owner. Paper 98, 4–7. Patent Owner responds that a motion to exclude evidence is not the proper vehicle to address incorporation by reference. Paper 100, 5–6. Patent Owner explains that we ruled on a motion

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to strike directed to the Declaration Portions. *Id.* at 6; *see* Paper 70 (Order denying Petitioner’s motion to strike portions of the Patent Owner Response). Patent Owner also argues that Petitioner has not met its burden in seeking exclusion of the Declaration Portions. Paper 100, at 6–8. Finally, Patent Owner argues that it did not improperly incorporate arguments from its experts’ declarations. *Id.* at 8–12. In reply, Petitioner reiterates that the Declaration Portions were improperly incorporated by reference into the Patent Owner Response. Paper 105, 4–5.

We deny Petitioner’s motion to exclude the Declaration Portions. Motions to exclude evidence are used to exclude evidence that is inadmissible. *See* Trial Practice Guide 2018 Update, 16–17. Petitioner does not argue that the Declaration Portions represent *inadmissible* evidence. Paper 98, 4–7; Paper 105, 4–5. Instead, Petitioner argues that the Declaration Portions represent improper *argument*, rather than evidence. *See* Paper 98, 4–7; Paper 105, 4–5. Petitioner fails to provide any basis under the Federal Rules of Evidence as to why the Declaration Portions are inadmissible. *See* Paper 98, 4–7; Paper 105, 4–5; Trial Practice Guide 2018 Update, 16 (“A motion to exclude must explain why the evidence is not admissible (e.g., relevance or hearsay).”). Although Petitioner did object to Exhibits 2429 and 2638, the objections were directed to bases under the Federal Rules of Evidence not argued in its motion. *See* Paper 49, 2, 16–17. As such, it is unclear on this record why Petitioner contends that the Declaration Portions are inadmissible.

Petitioner appears to use its motion to exclude to reargue its motion to strike, this time trying to exclude the underlying declaration paragraphs, rather than the sections of the Patent Owner Response that allegedly

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incorporate by reference these paragraphs. *See* Paper 98, 4–7; *see also* Paper 70 (denying Petitioner’s motion to strike). We already addressed Petitioner’s motion to strike and how we would address any arguments improperly incorporated by reference. Paper 70.

2. *Patent Owner’s Motion to Exclude Evidence*

We now turn to Patent Owner’s motion, in which Patent Owner seeks to exclude the entirety or portions of several exhibits filed by Petitioner and also seeks to exclude certain testimony cited by Petitioner. We address each category of information in turn below.

a. *Exhibits 1468–1470, and References to These Exhibits in Dr. Beaman’s Declaration*

Patent Owner contends that Exhibits 1468–1470, and references to these exhibits in Dr. Beaman’s declaration (Exhibit 1402) should be excluded under Federal Rules of Evidence 402, 403, and 1002. Paper 99, 1–2. According to Patent Owner, Exhibits 1468–1470 are animations that do not accurately or completely represent the evidence underlying the animations. *Id.* at 1.

In opposition to Patent Owner’s motion generally, Petitioner argues that Patent Owner fails to follow the proper rules and procedures, and that we should deny the motion, in its entirety, on that basis. Paper 101, 1–2 (quoting Trial Practice Guide 2018 Update, 16). We decline to deny Patent Owner’s motion on this basis. We note that Petitioner’s motion, addressed above, also fails to follow the procedure outlined in the Trial Practice Guide. *See* Paper 98.

As to the merits, we deny Patent Owner’s motion as to Exhibits 1468–1470 as moot, as we do not rely on them in this Decision. *See* Trial Practice

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Guide 2018 Update, 17. We also do not rely on any of the paragraphs of Dr. Beaman's declaration (Ex. 1402) that refer to these exhibits. *See id.*

b. Exhibit 1411

Patent Owner argues that Exhibit 1411 should be excluded under Federal Rule of Evidence 1002 "as not being an original" and under Federal Rule of Evidence 1003 "as not being an admissible duplicate due to it being an inaccurate copy with portions of the document cut off." Paper 99, 2 (discussing Ex. 1411, 11 (and "odd numbered pages following that")). We deny Patent Owner's motion as to Exhibit 1411 as moot, as we do not rely on it in this Decision. *See* Trial Practice Guide 2018 Update, 17.

c. Exhibits 1665–1669

Patent Owner "objects to Exhibits 1665–1669 on the ground that they contain improper attorney argument in violation of the page/word count limits for replies." Paper 99, 2. Patent Owner argues that these exhibits improperly incorporate attorney argument into Petitioner's Reply. *Id.* at 2–4. These exhibits relate to Petitioner's allegations that Patent Owner improperly incorporates arguments from declarations into its Patent Owner Response. *See id.*

In opposition, Petitioner argues that Patent Owner does not cite any evidentiary basis for excluding these exhibits, and argues that a motion to exclude is not the proper procedure to challenge these exhibits. Paper 101, 5 (discussing Trial Practice Guide 2018 Update, 17). Patent Owner replies that, by filing Exhibits 1665–1669, Petitioner exceeded the word count for a Reply. Paper 104, 2–3.

We do not exclude Exhibits 1665–1669 because Patent Owner provides no evidentiary basis as to why these exhibits constitute

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inadmissible evidence. To the extent that these exhibits do contain attorney argument, the proper remedy in such a situation is for us, when considering Petitioner's Reply arguments and evidence as a whole, to not consider any "arguments" found only in these exhibits and not adequately explained in the Reply. *See* Trial Practice Guide 2018 Update, 17–18; *cf.* Paper 70, 5 (addressing Petitioner's motion to strike).

d. Exhibit 1625

Patent Owner contends that Exhibit 1625, Dr. Beaman's declaration supporting the Reply, mischaracterizes certain earlier testimony of Patent Owner's expert and exceeds the proper scope of a reply. Paper 99, 5. According to Patent Owner, Dr. Beaman's declaration mischaracterizes testimony from Patent Owner's declarant in support of its Preliminary Response (Dr. William K. Durfee) based on characterizations of the testimony from Petitioner's counsel. *Id.* at 5–6. Patent Owner also argues that addressing Dr. Durfee's testimony, which was not relied on in the Patent Owner Response, is outside the scope of a proper reply. *Id.* at 6.

Petitioner responds that Patent Owner does not provide a basis under the Federal Rules of Evidence to exclude Dr. Beaman's testimony. Paper 101, 8. Petitioner adds that a motion to exclude should not be directed to arguments or evidence that a party believes exceeds the proper scope of a reply. *Id.* at 8–9. According to Petitioner, the testimony sought to be excluded identifies inconsistencies between Patent Owner's declarants' testimony. *Id.* at 9.

In reply, Patent Owner argues that Dr. Beaman's testimony lacks proper foundation. Paper 104, 3–4.

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We do not exclude this evidence. Patent Owner did not rely on a lack of foundation in its objection to Dr. Beaman’s testimony or in its opening brief on its motion to exclude. *See* Paper 77, 5 (¶ 11) (“Team Worldwide objects to the Reply Declaration of Joseph J. Beaman, Jr. (Exhibit 1625), which mischaracterizes Exhibit 2401 and/or exceeds the proper scope of reply.”); Paper 99, 5–6 (contending that Exhibit 1625 “mischaracterizes Patent Owner’s early expert testimonial evidence (Exhibit 2401) and/or exceeds the proper scope of reply”). Accordingly, Patent Owner does not identify an evidentiary basis to exclude the evidence. Also, neither Patent Owner’s motion to exclude nor its objection identifies, with particularity, those portions of Dr. Beaman’s Reply declaration to be excluded, as Patent Owner’s citations were presented as exemplary only. *See* Paper 77, 5 (¶ 11) (“See, for example, Exhibit 1625 at ¶¶ 7, 8, 14, 15, 76, 86, and 91.”); Paper 99, at 5 (same), 6 (same).

e. Exhibit 1650

Patent Owner states to have “objected to the Declaration of Ryan Slate in Support of Petitioner[’s] Reply (Ex. 1650) on the basis that as of the discussions between the Parties conducted to date Patent Owner was not afforded a proper opportunity to cross-examine Mr. Slate.” Paper 99, 6. Patent Owner does not address this evidence in reply to Petitioner’s contention that this objection should be withdrawn. *See* Paper 101, 10; Paper 104. We view the portion of Patent Owner’s motion addressing this exhibit as withdrawn.

f. Exhibits 1651–1654 and 1679

Patent Owner contends that Exhibits 1651–1654 and 1679 include hearsay, are irrelevant, are unfairly prejudicial, and lack foundation. Paper

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99, 7. We deny Patent Owner's motion as to these exhibits as moot, as we do not rely on them in this Decision. *See* Trial Practice Guide 2018 Update, 17.⁴⁰

III. CONCLUSION

Upon consideration of the Petition, Response, Reply, Sur-reply and the evidence of record, we determine that Petitioner (1) has proven by a preponderance of the evidence that claims 1–12 and 16–23 of the '394 patent would have been obvious based on Chaffee and Wu, and (2) has proven by a preponderance of the evidence that claims 1–12 and 16–23 would have been obvious based on Chaffee, Scott, and Pisante.⁴¹

We deny Petitioner's and Patent Owner's motions to exclude evidence.

⁴⁰ Although we discuss Exhibits 1651 and 1652 above (*see supra* p. 75), we determine that Petitioner has not shown how those exhibits support its argument. Because our discussion above does not rely on Exhibits 1651 and 1652 in the overall determination as to unpatentability, and to maintain a complete record of this proceeding, we do not exclude these exhibits.

⁴¹ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding, 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

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IV. ORDER

For the reasons above, it is:

ORDERED that Petitioner has proven by a preponderance of the evidence that claims 1–12 and 16–23 are unpatentable;

FURTHER ORDERED that Petitioner's and Patent Owner's motions to exclude evidence (Papers 98, 99) are denied;

FURTHER ORDERED that, pursuant to 35 U.S.C. § 318(b), upon expiration of the time for appeal of this decision, or the termination of any such appeal, a certificate shall issue canceling claims 1–12 and 16–23;

FURTHER ORDERED that the parties shall file, within 10 days of entry of this Decision, a joint motion to seal this Decision, and shall provide, along with the joint motion, an exhibit with a proposed redacted public version of this Decision; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

In summary:

Claims	35 U.S.C. §	References	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–12, 16–23	103	Chaffee and Wu	1–12, 16–23	
1–12, 16–23	103	Chaffee, Scott, and Pisante	1–12, 16–23	
Overall Outcome			1–12, 16–23	

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(12) **United States Patent**
Wang(10) **Patent No.:** **US 7,246,394 B2**
(45) **Date of Patent:** ***Jul. 24, 2007**(54) **INFLATABLE PRODUCT WITH BUILT-IN HOUSING AND SWITCHING PIPE**(75) Inventor: **Cheng Chung Wang, Taipei (TW)**(73) Assignee: **Team Worldwide Corporation, Taipei (TW)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **11/326,829**(22) Filed: **Jan. 7, 2006**(65) **Prior Publication Data**

US 2006/0112492 A1 Jun. 1, 2006

Related U.S. Application Data

(62) Division of application No. 09/886,030, filed on Jun. 22, 2001, now Pat. No. 6,990,700.

(51) **Int. Cl.**
A47C 27/08 (2006.01)(52) **U.S. Cl.** **5/713; 5/708; 5/655.3**(58) **Field of Classification Search** **5/706, 5/708, 713, 655.3; 417/411, 315, 238-239; 137/625.22, 565.12**

See application file for complete search history.

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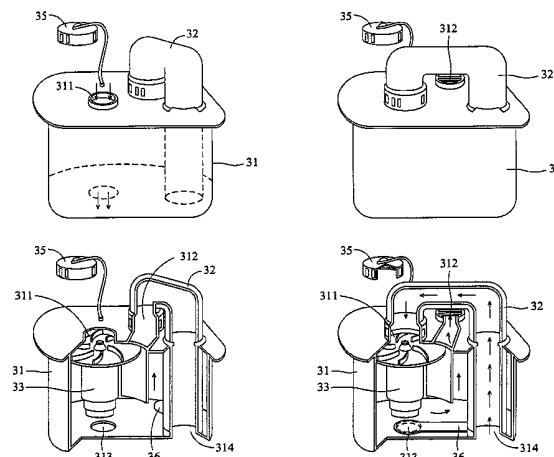
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Instruction sheet for "Insta-Bed", Sep. 2000, USA.

Primary Examiner—Patricia Engle
Assistant Examiner—Fredrick Conley

(74) *Attorney, Agent, or Firm*—Quintero Law Office(57) **ABSTRACT**

An inflatable product includes an inflatable body, a fan and motor assembly for pumping air, a housing built into the inflatable body, and an air conduit disposed at least in part in the housing. The housing has an interior region. The air conduit is movable between a first position and a second position, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position. Air flows between the interior region of the housing and the inflatable body during inflation and deflation.

23 Claims, 33 Drawing Sheets**INTEX; BESTWAY; WALMART**
EXHIBIT 1001**APPX000546**

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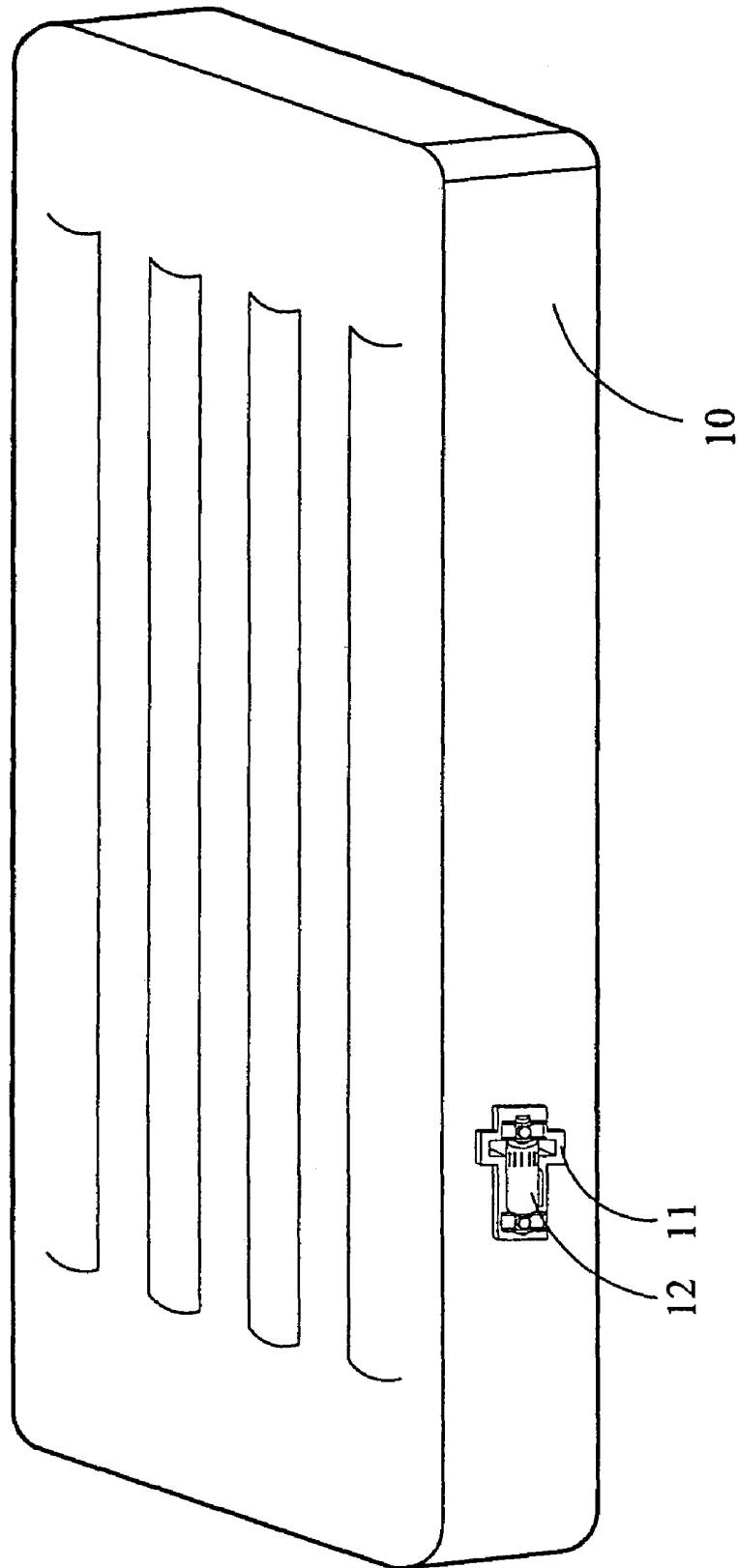


FIG. 1A

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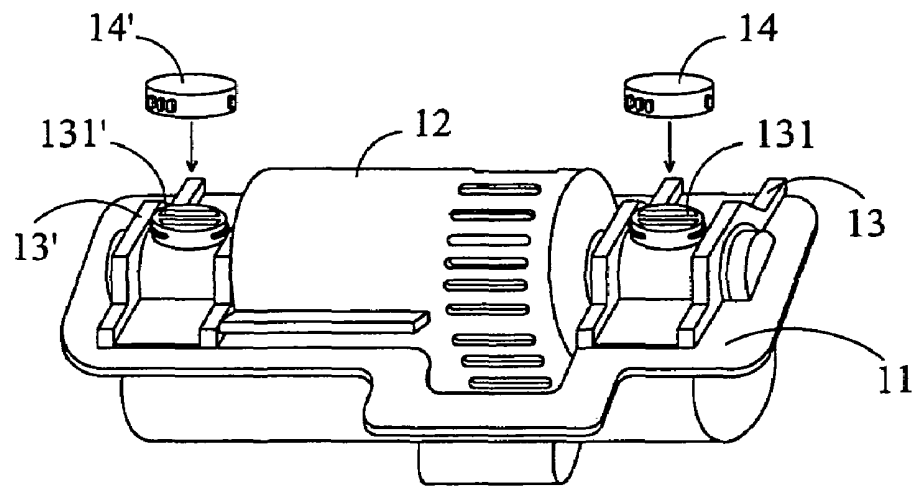


FIG. 1B

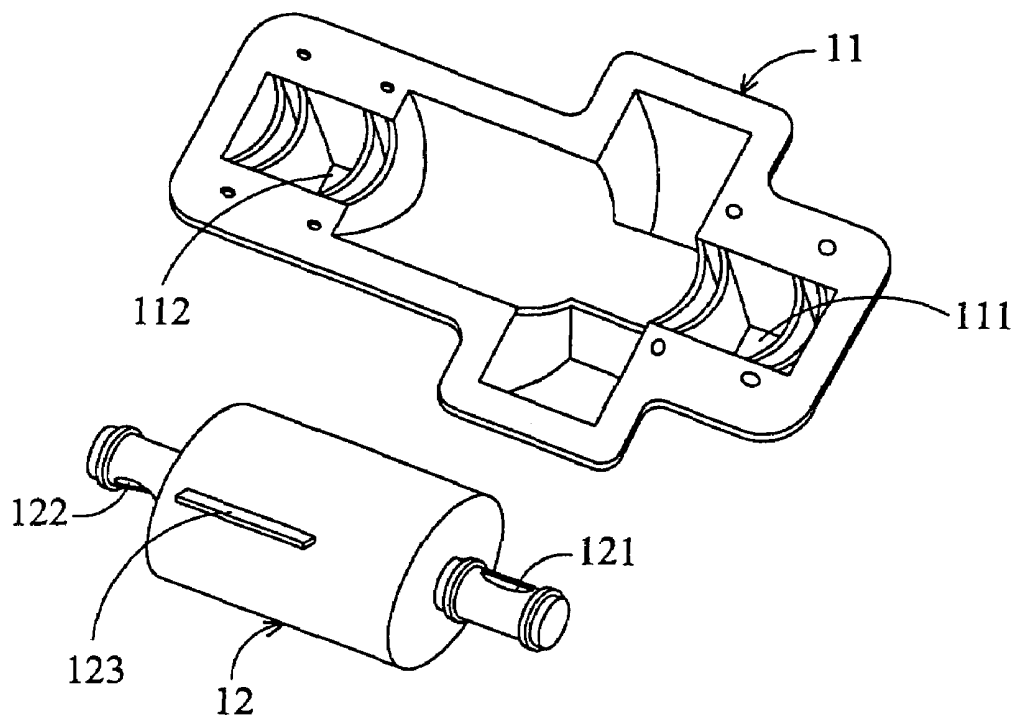


FIG. 1C

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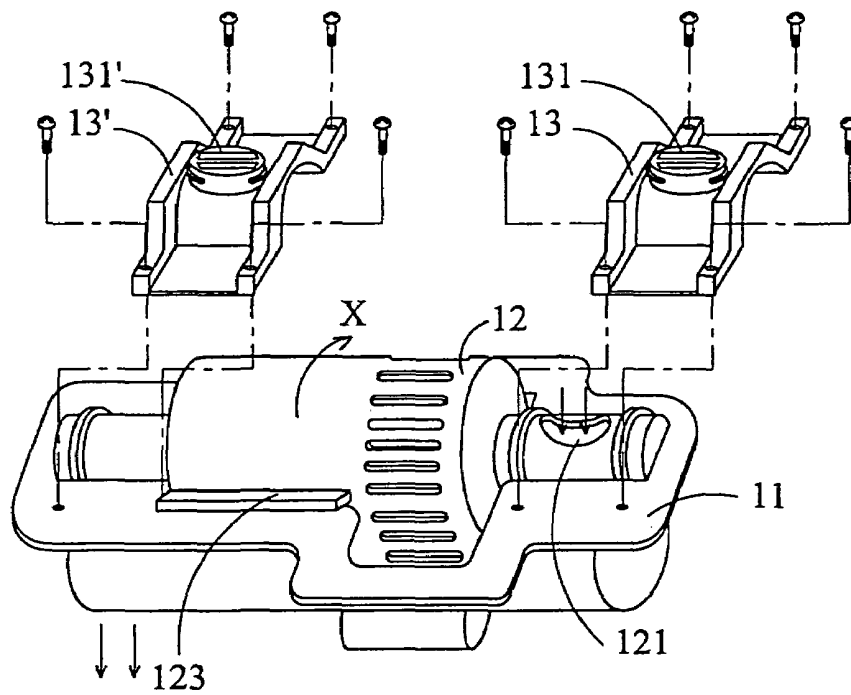


FIG. 1D

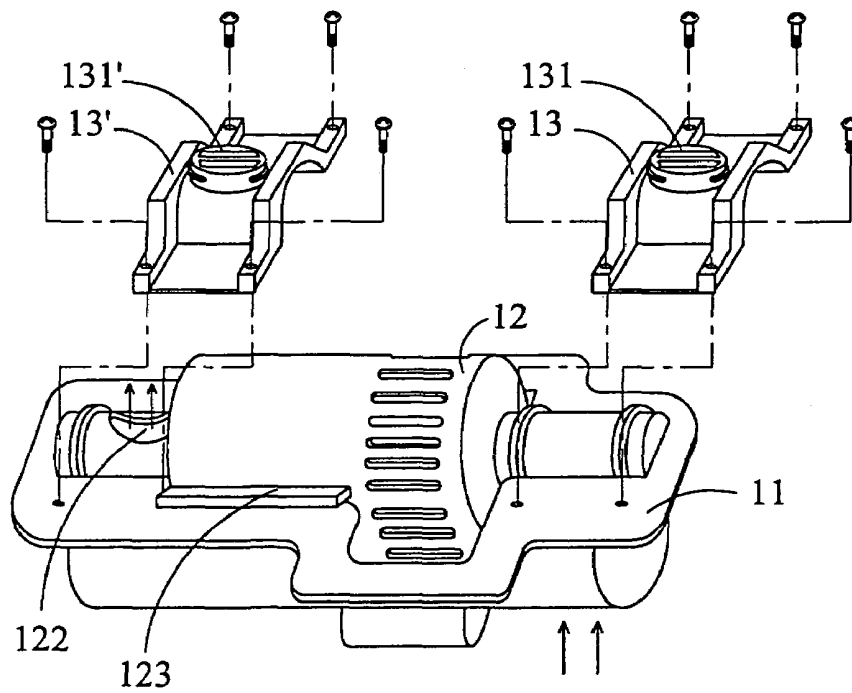


FIG. 1E

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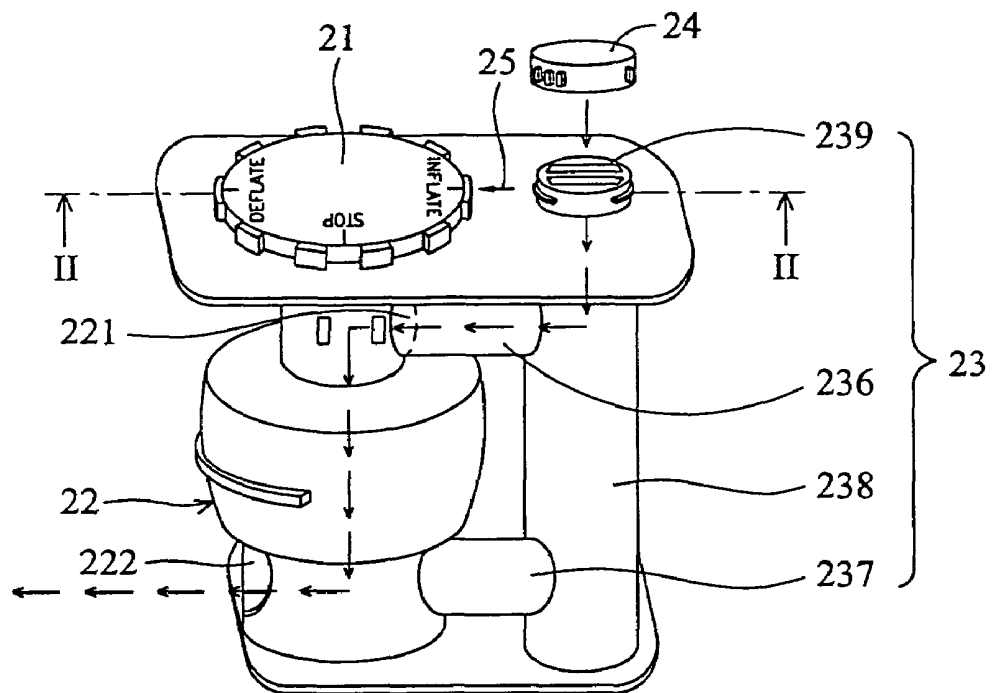


FIG. 2A

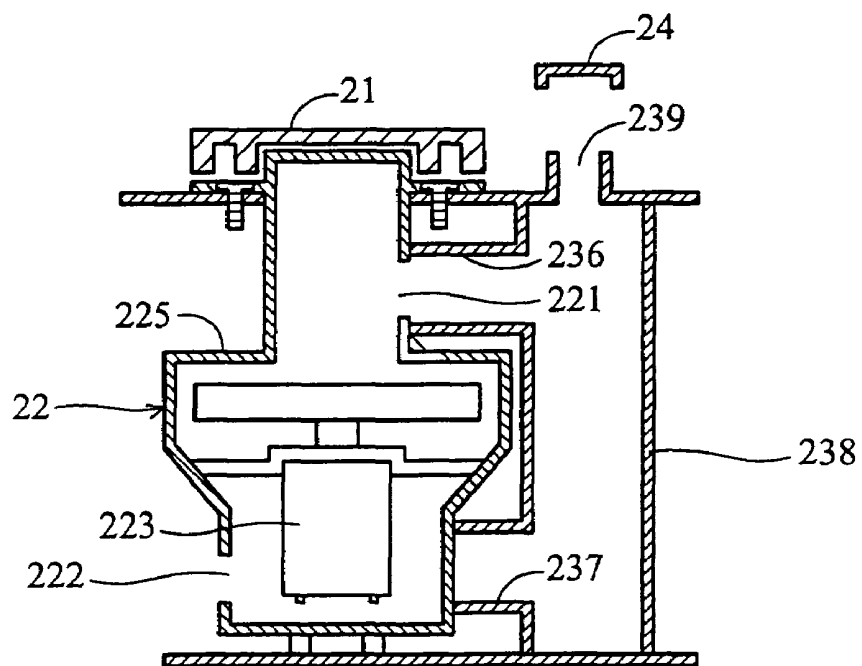


FIG. 2B

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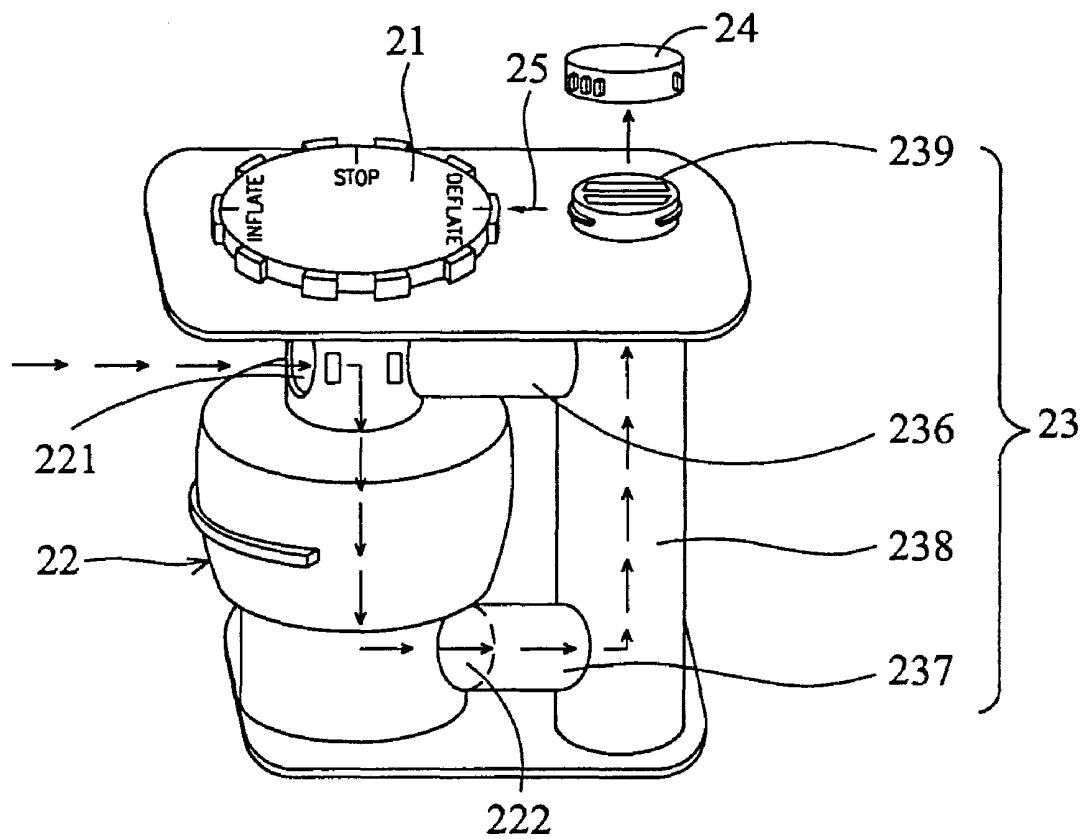


FIG. 2C

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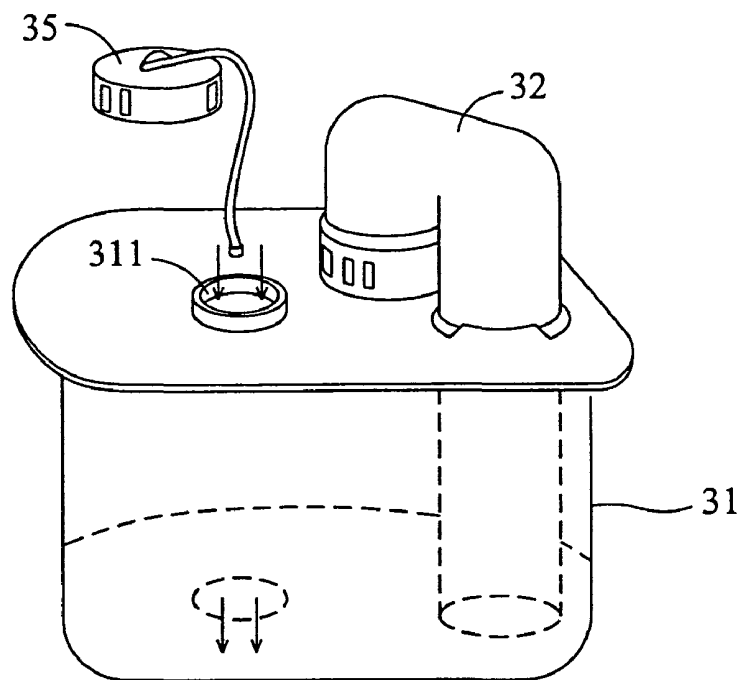


FIG. 3A

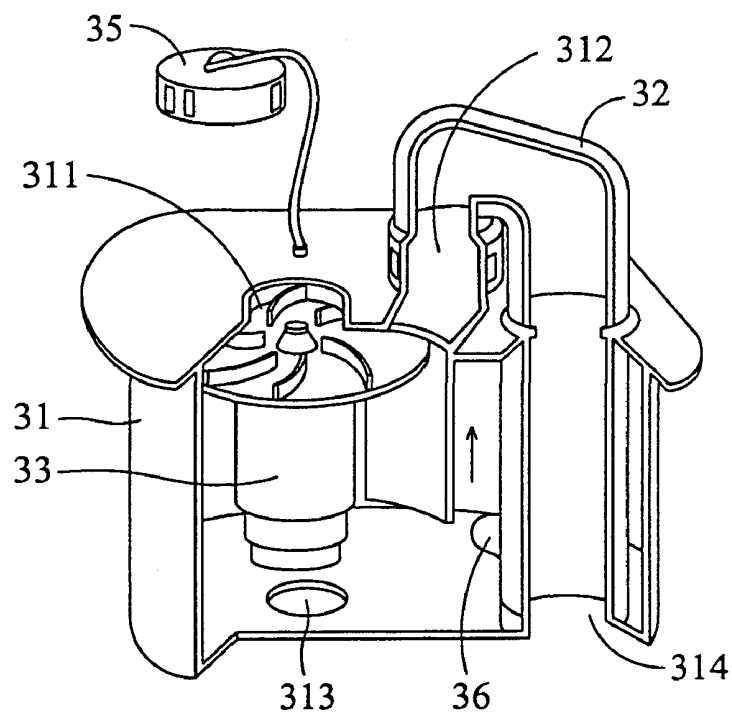


FIG. 3B

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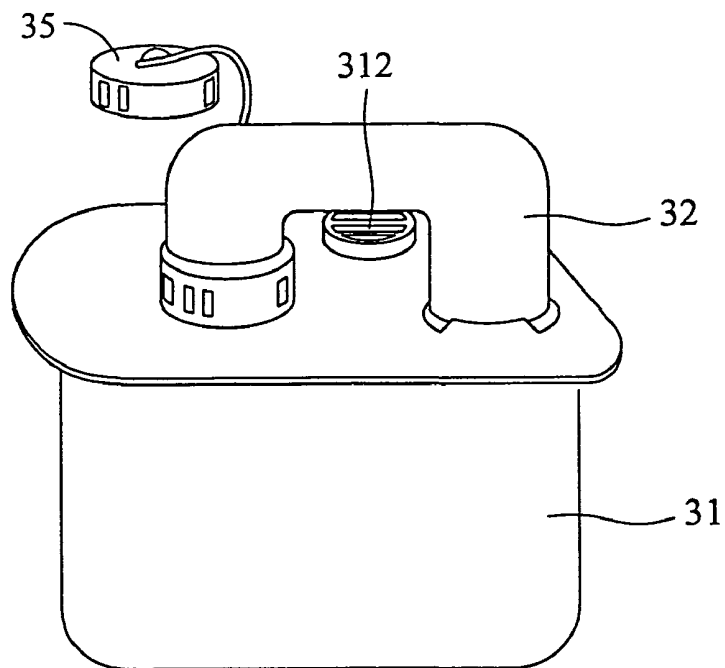


FIG. 3C

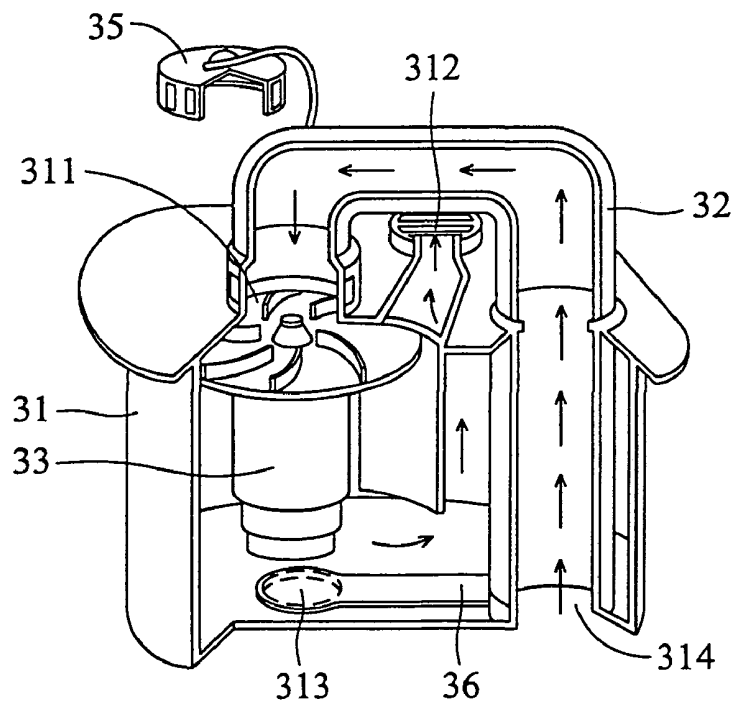


FIG. 3D

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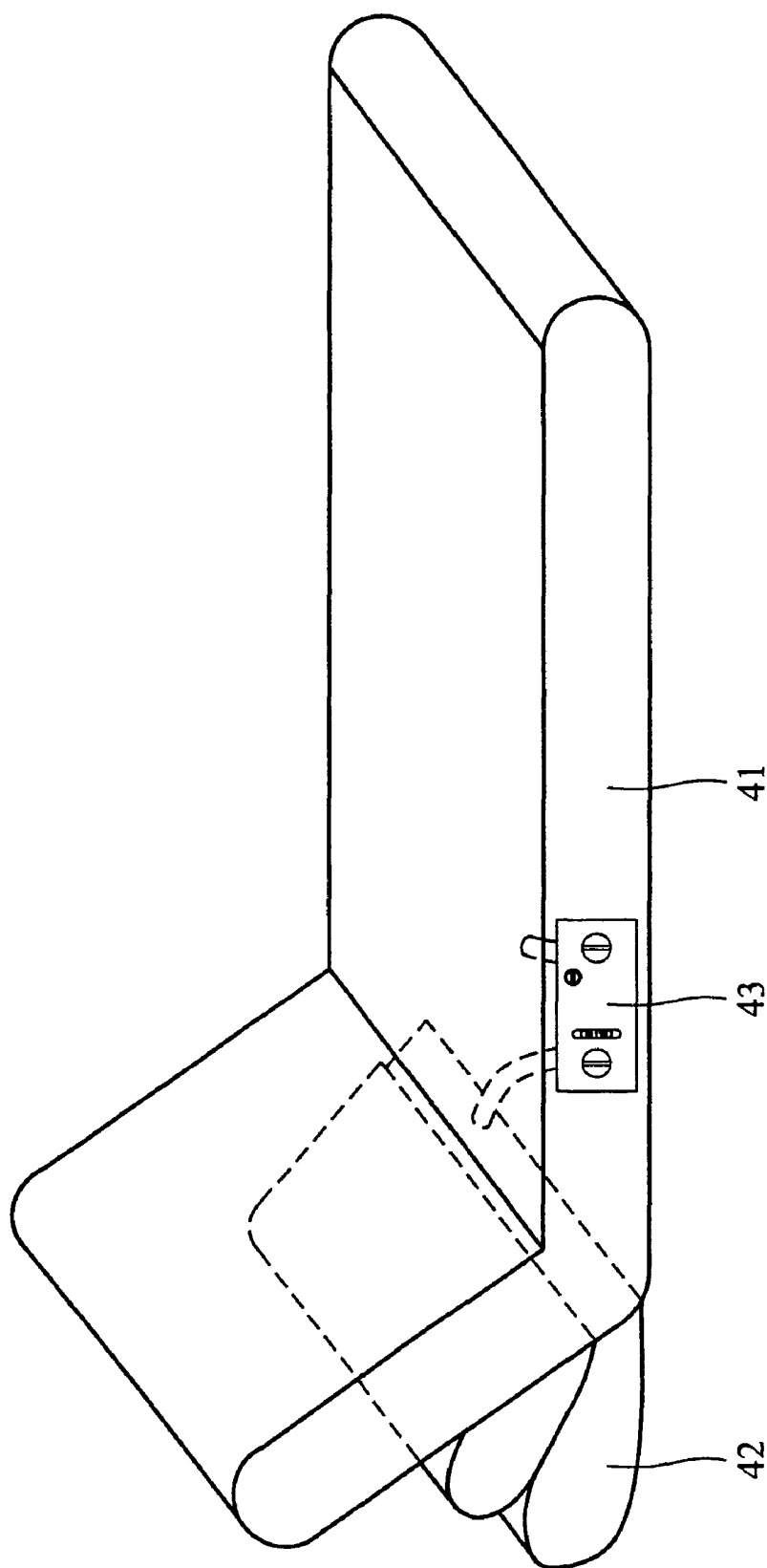


FIG. 4A

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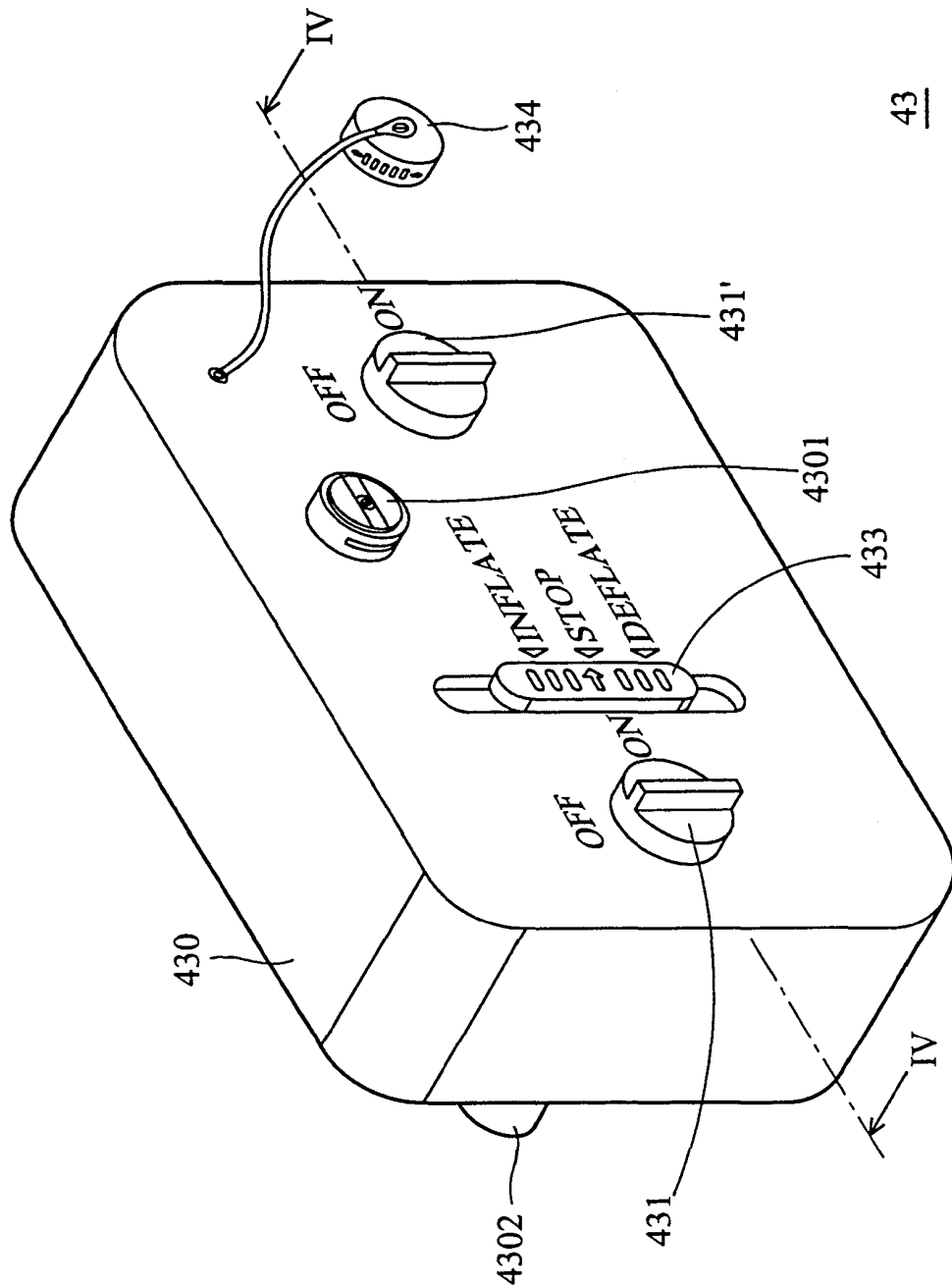


FIG. 4B

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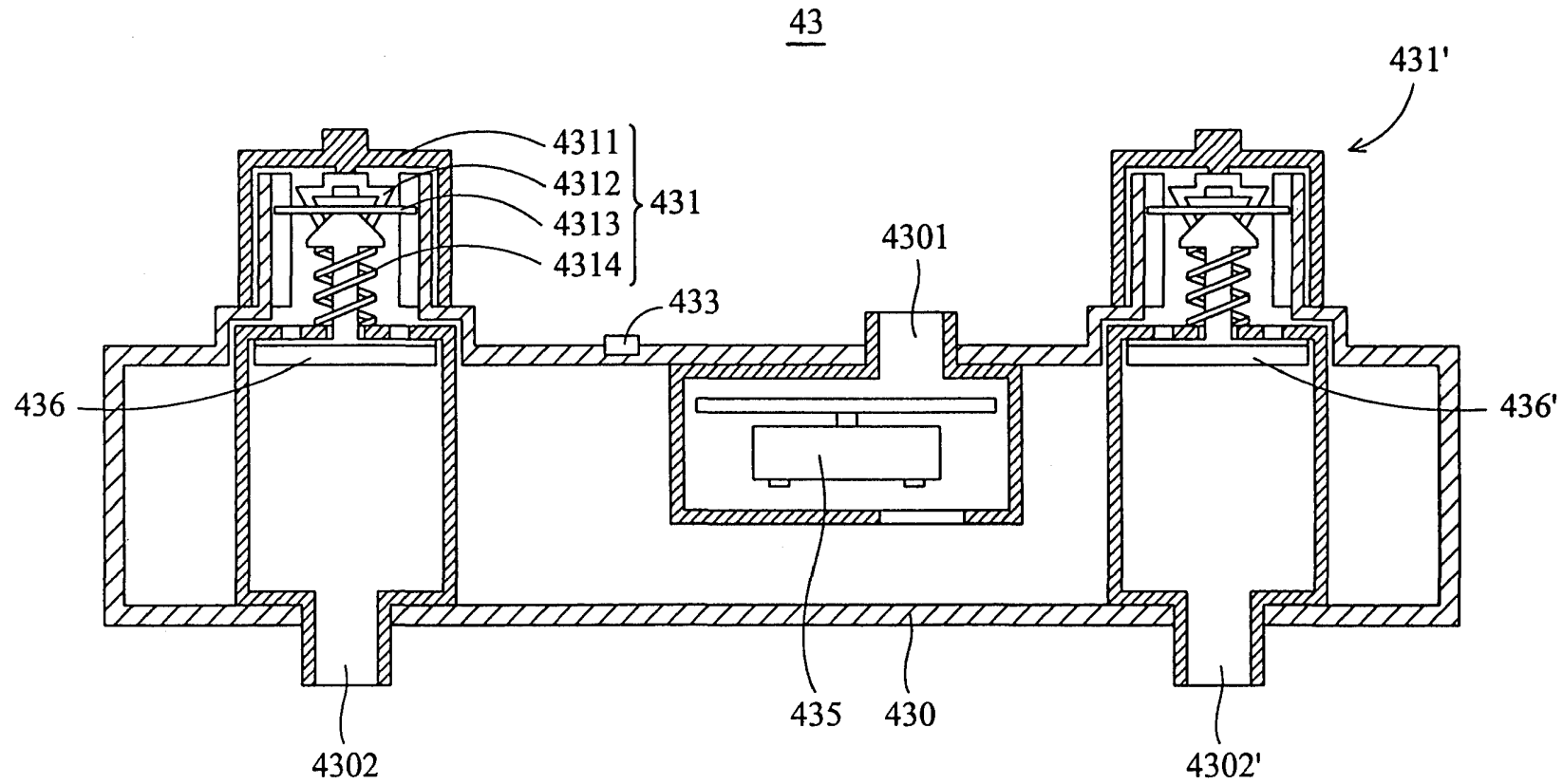


FIG. 4C

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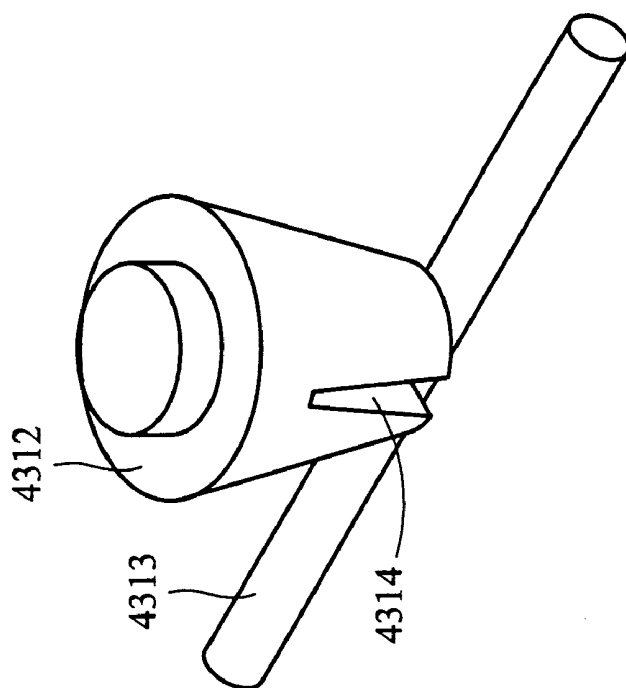


FIG. 4E

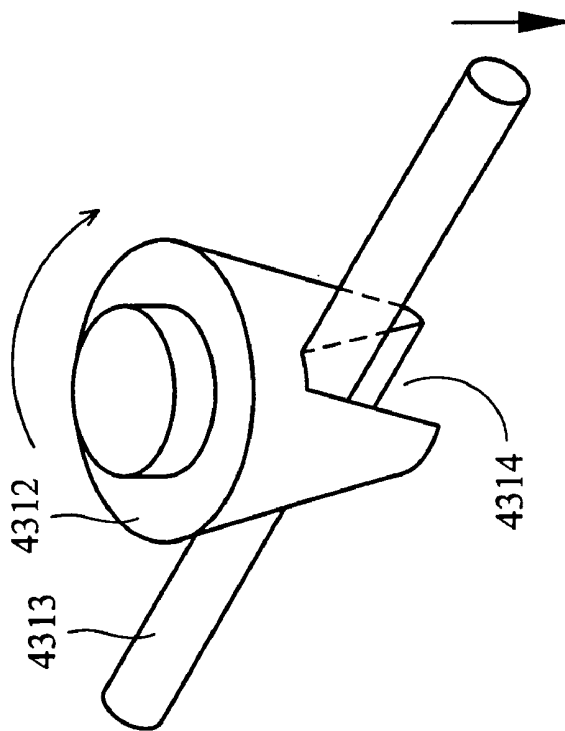


FIG. 4D

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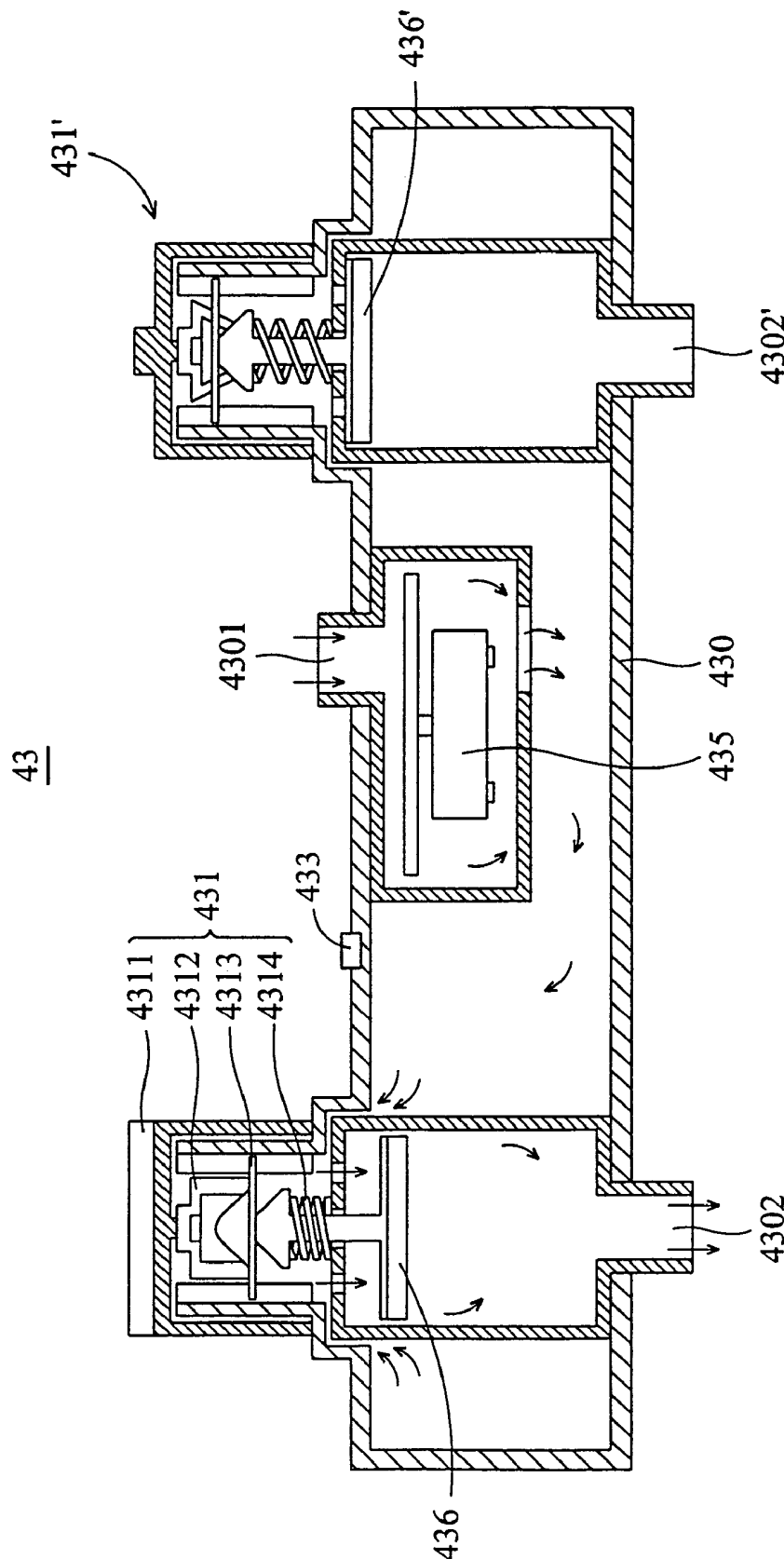


FIG. 4F

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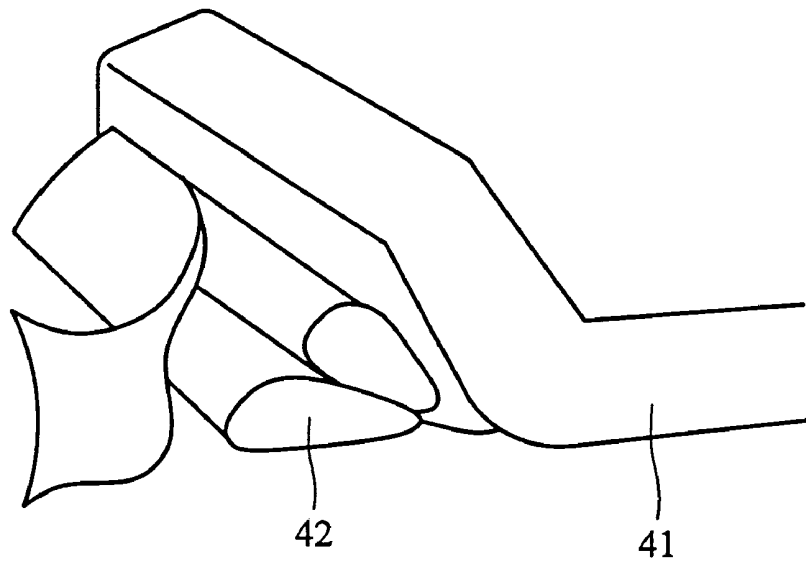


FIG. 4G

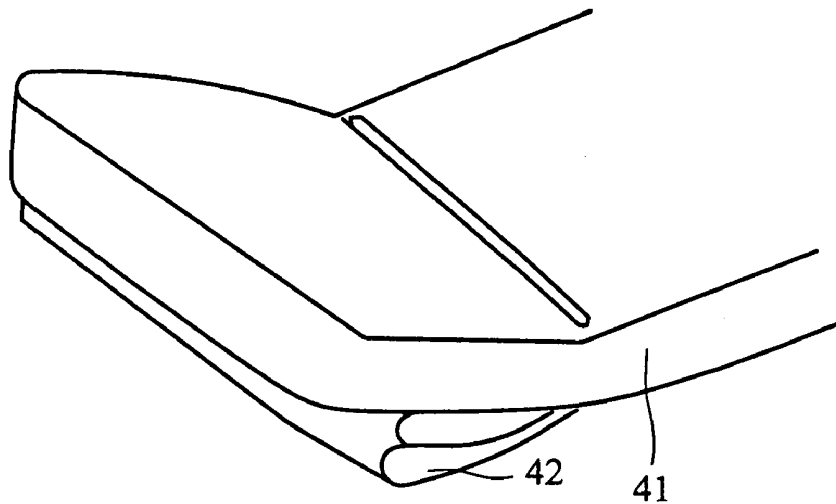


FIG. 4H

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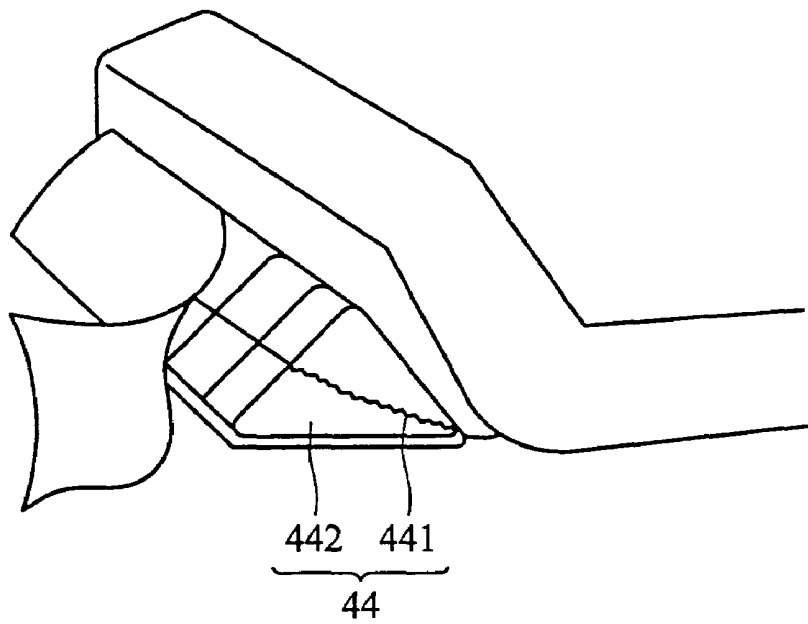


FIG. 4I

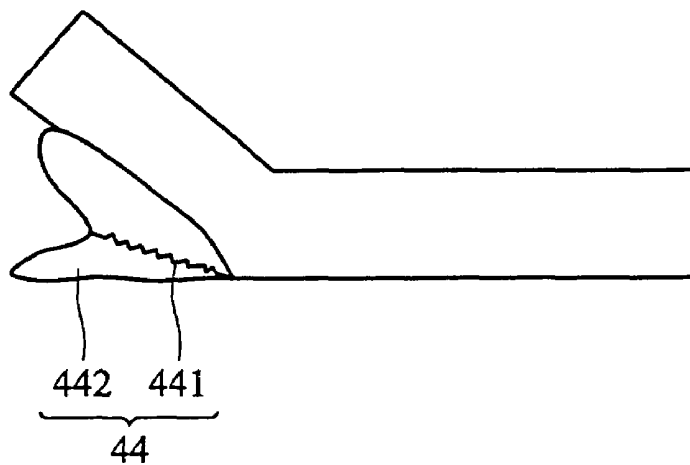


FIG. 4J

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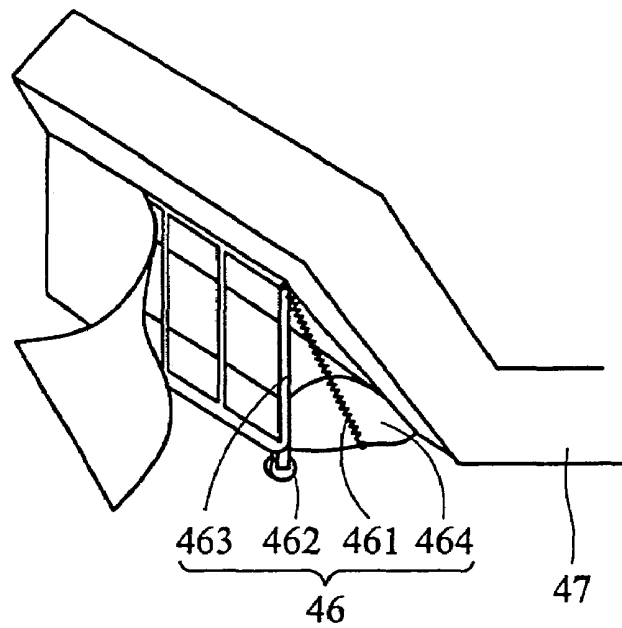


FIG. 4K

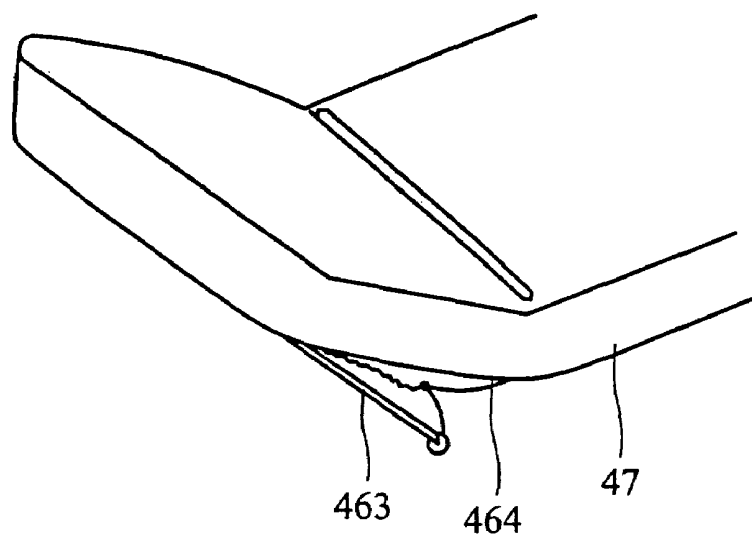


FIG. 4L

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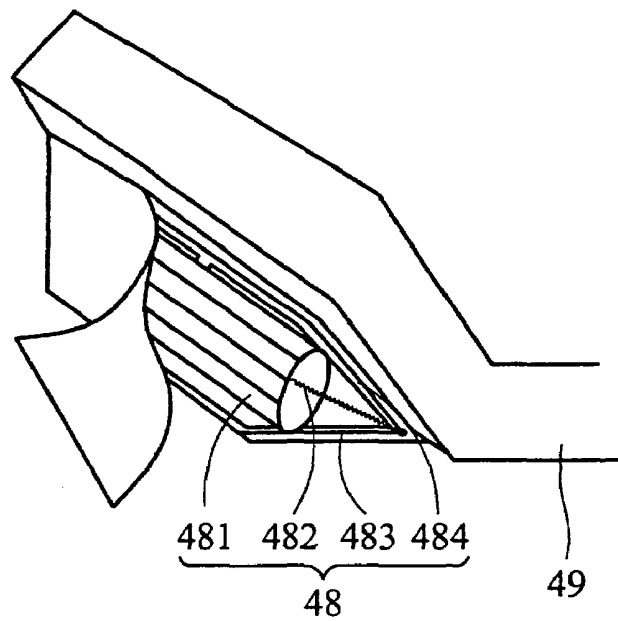


FIG. 4M

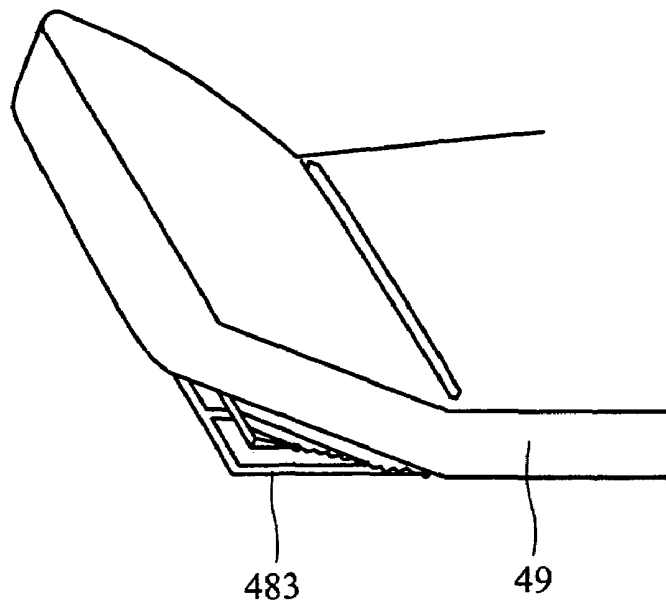


FIG. 4N

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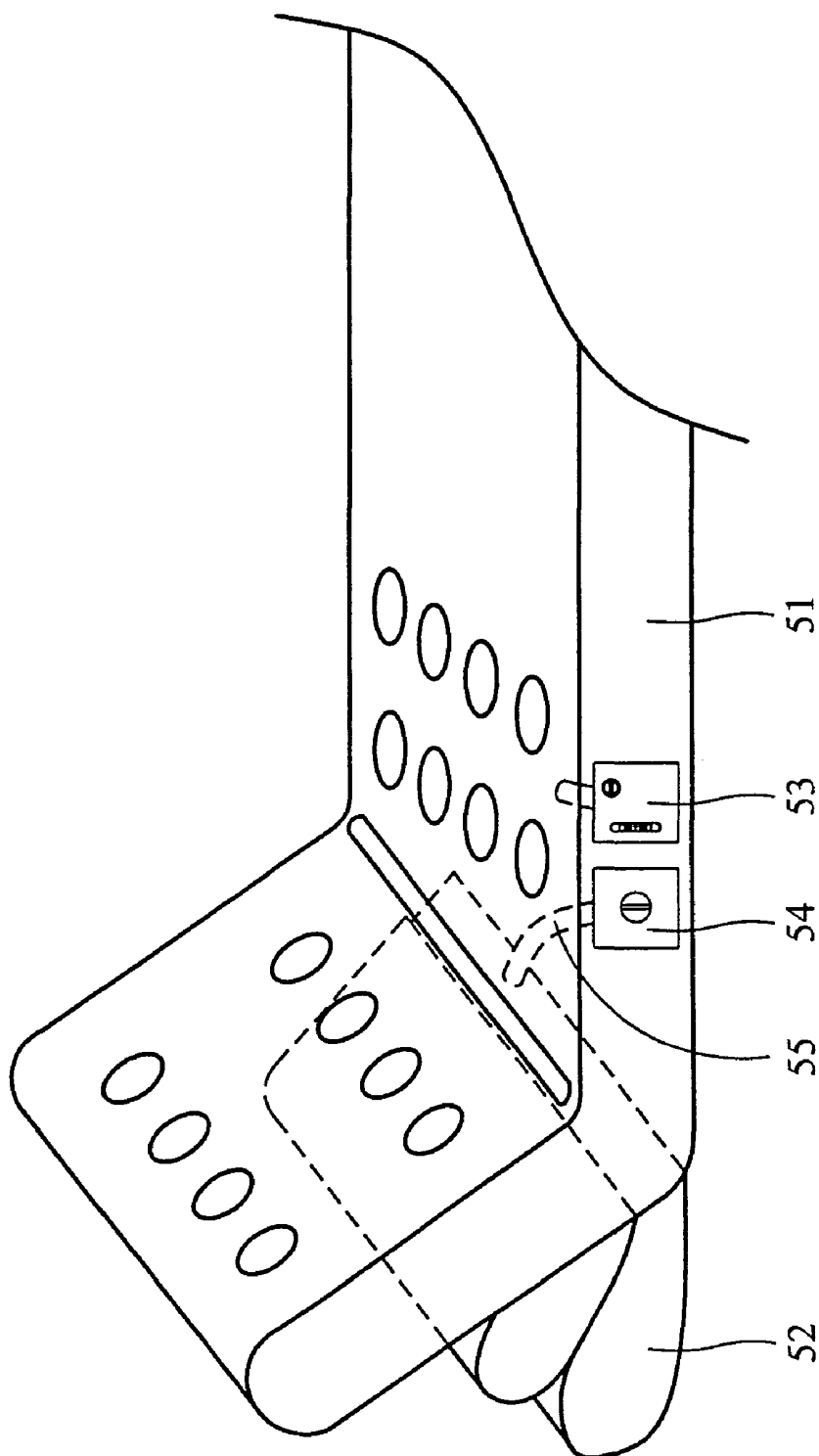


FIG. 5A

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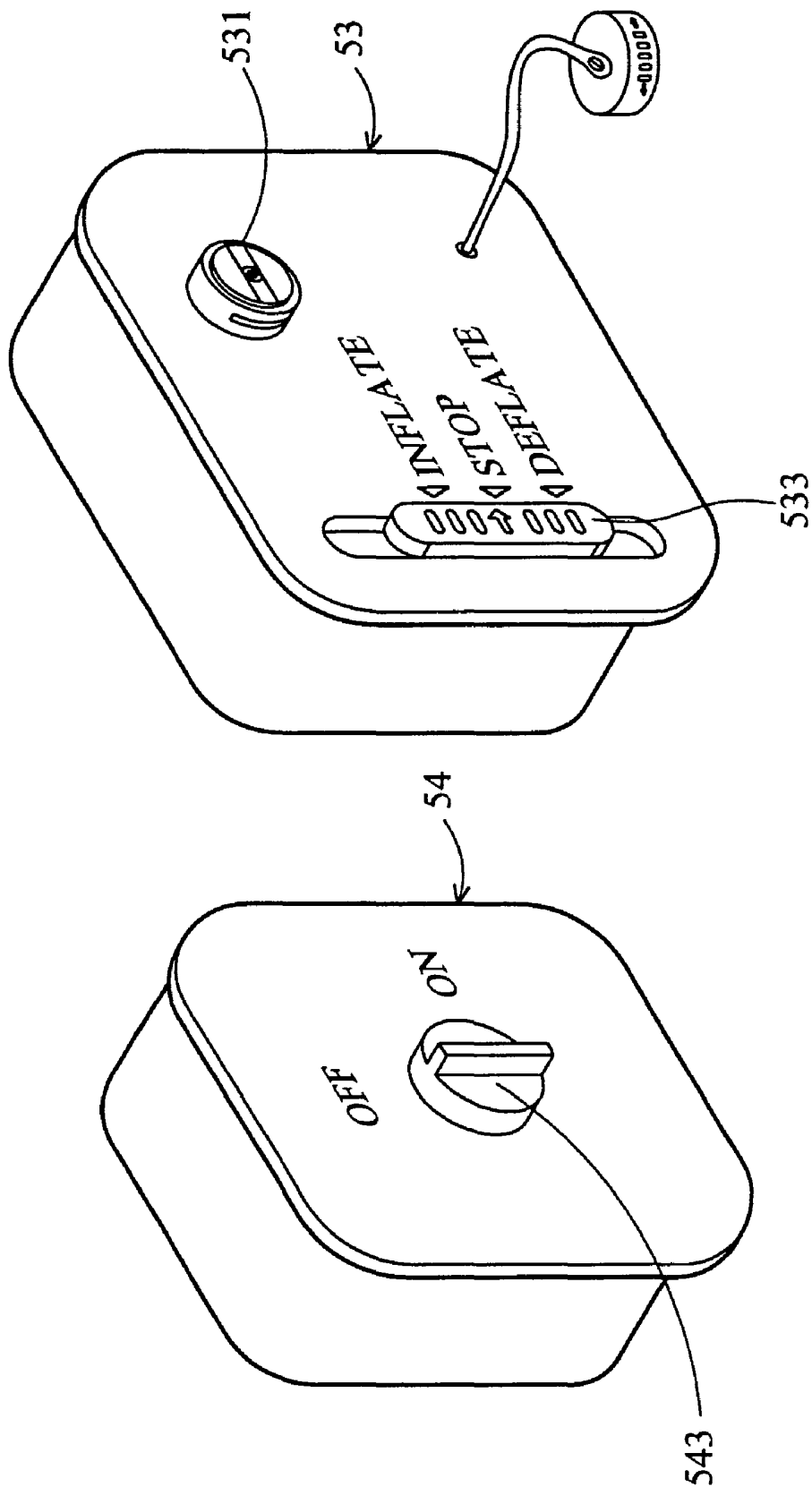


FIG. 5B

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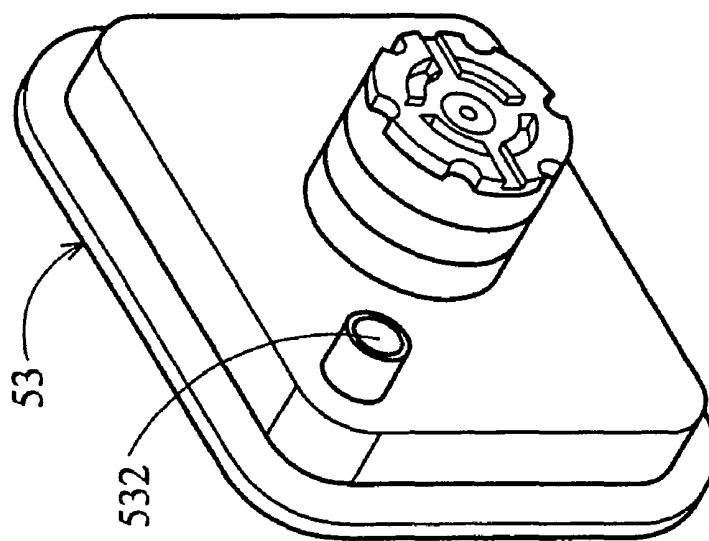
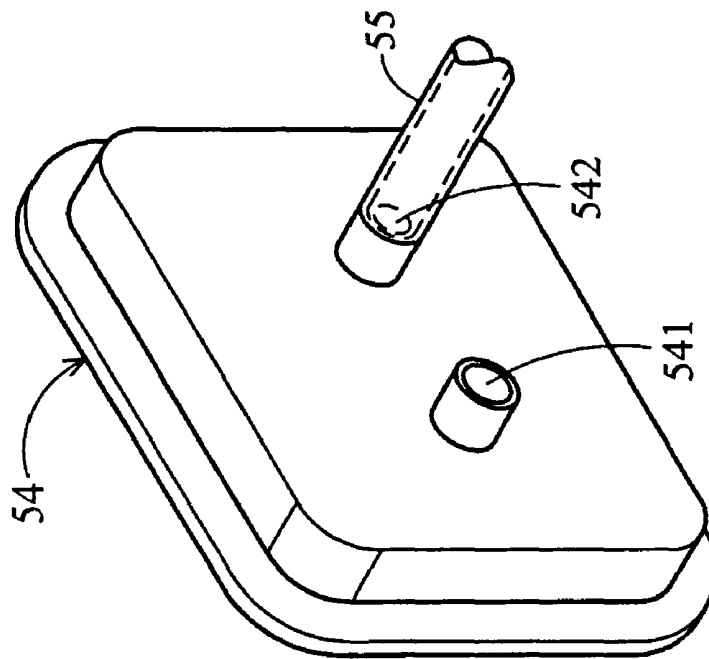


FIG. 5C

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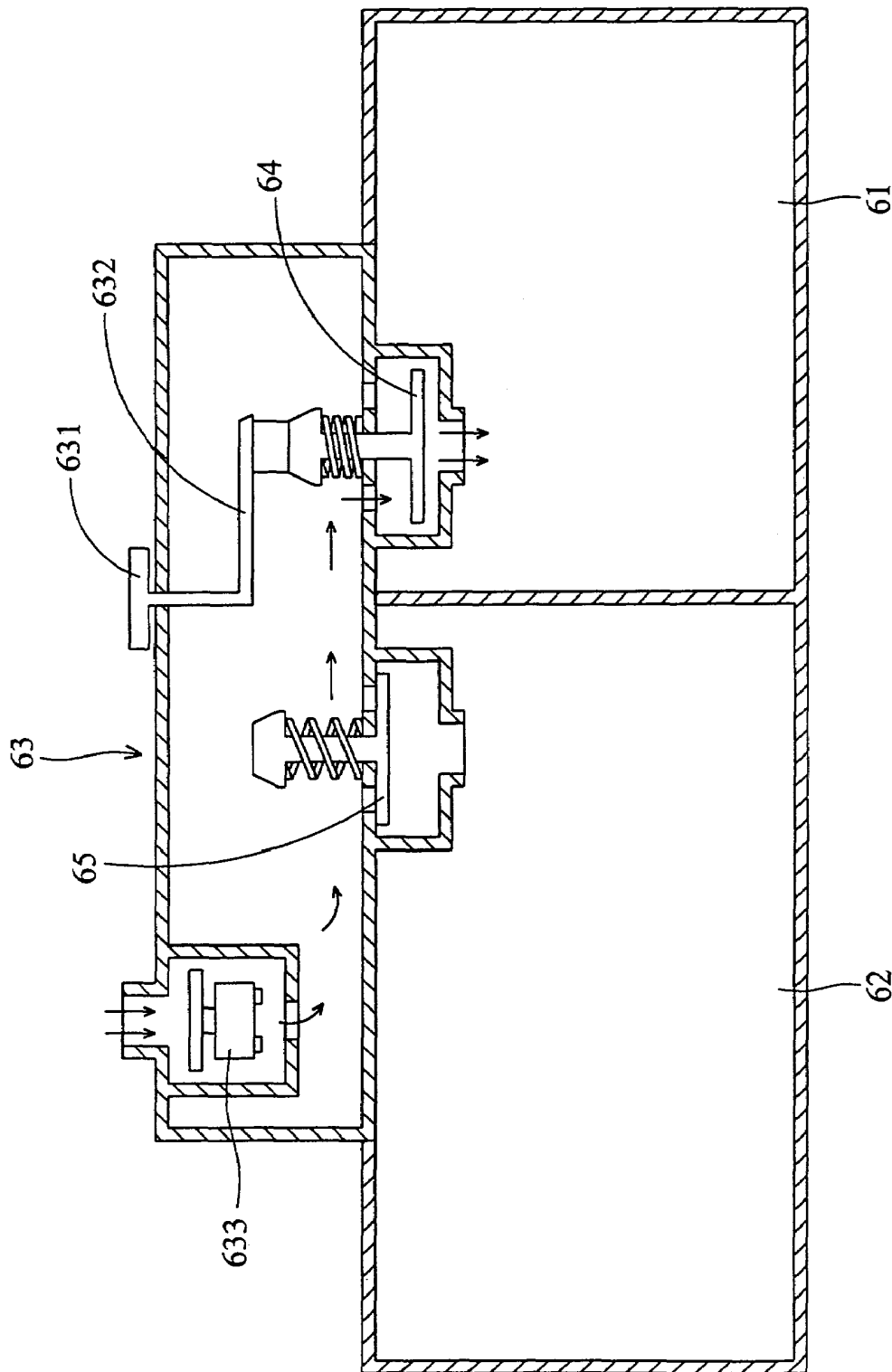


FIG. 6

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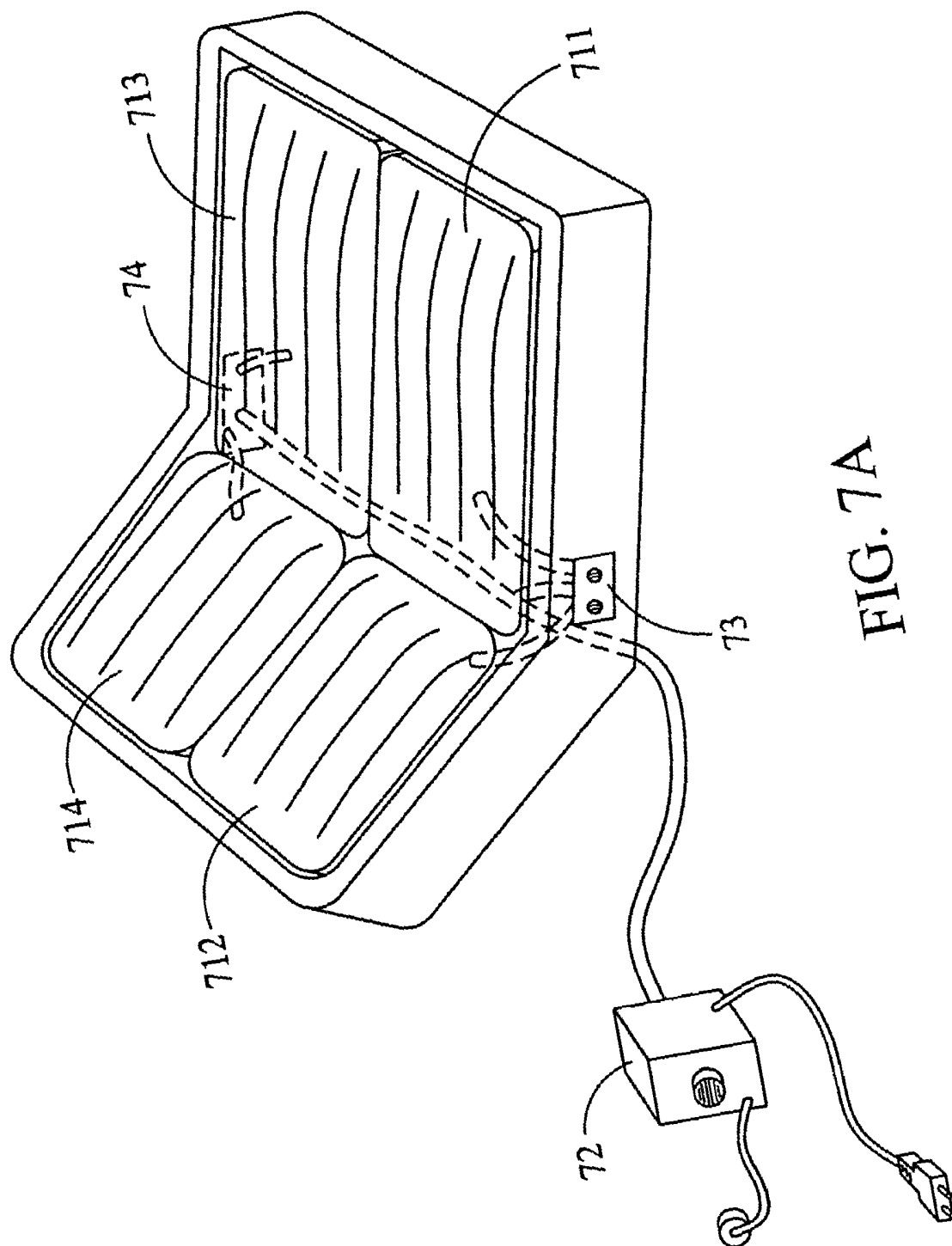


FIG. 7A

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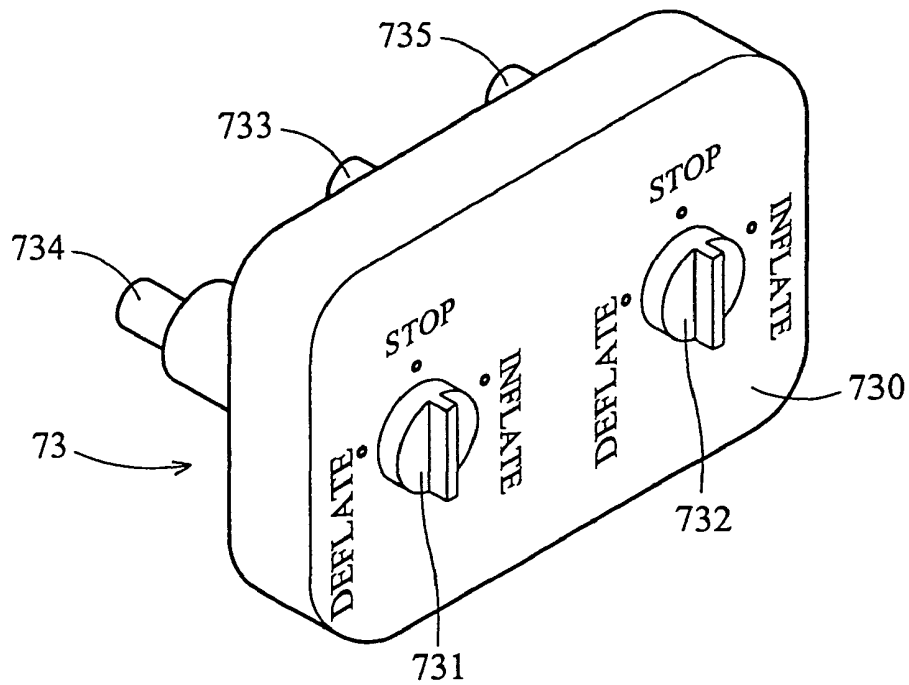


FIG. 7B

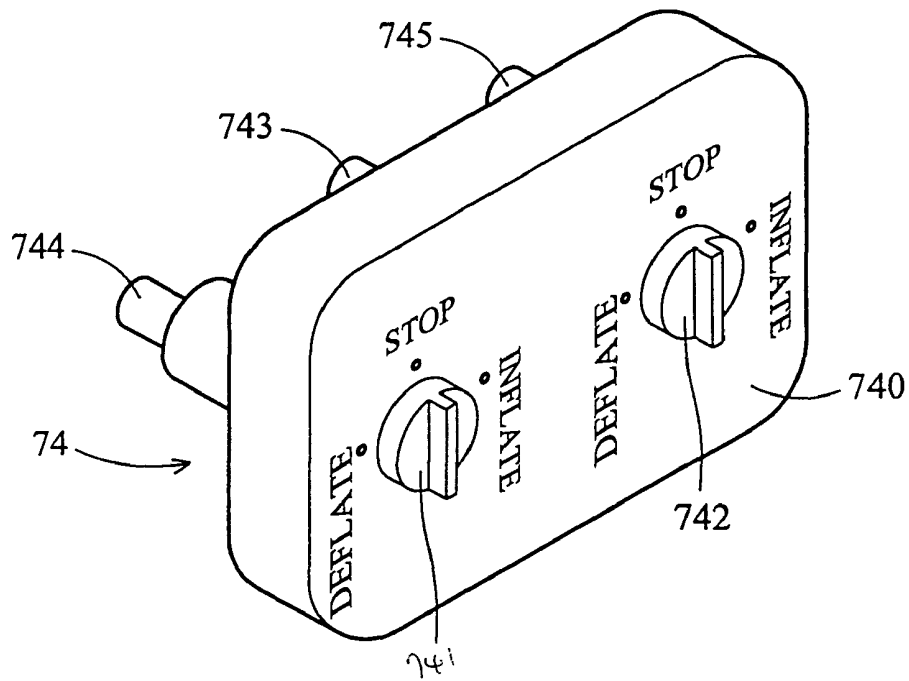


FIG. 7C

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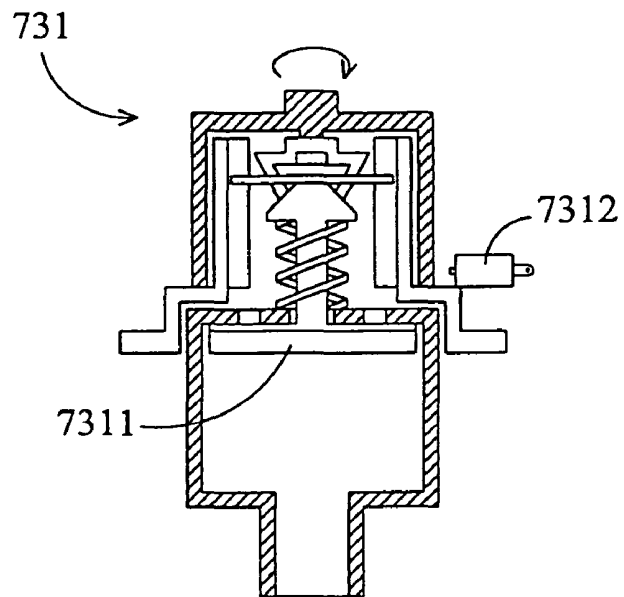


FIG. 7D

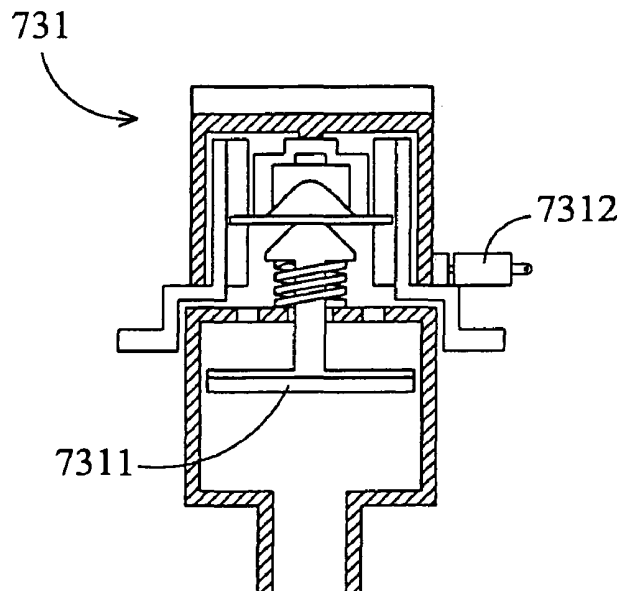


FIG. 7E

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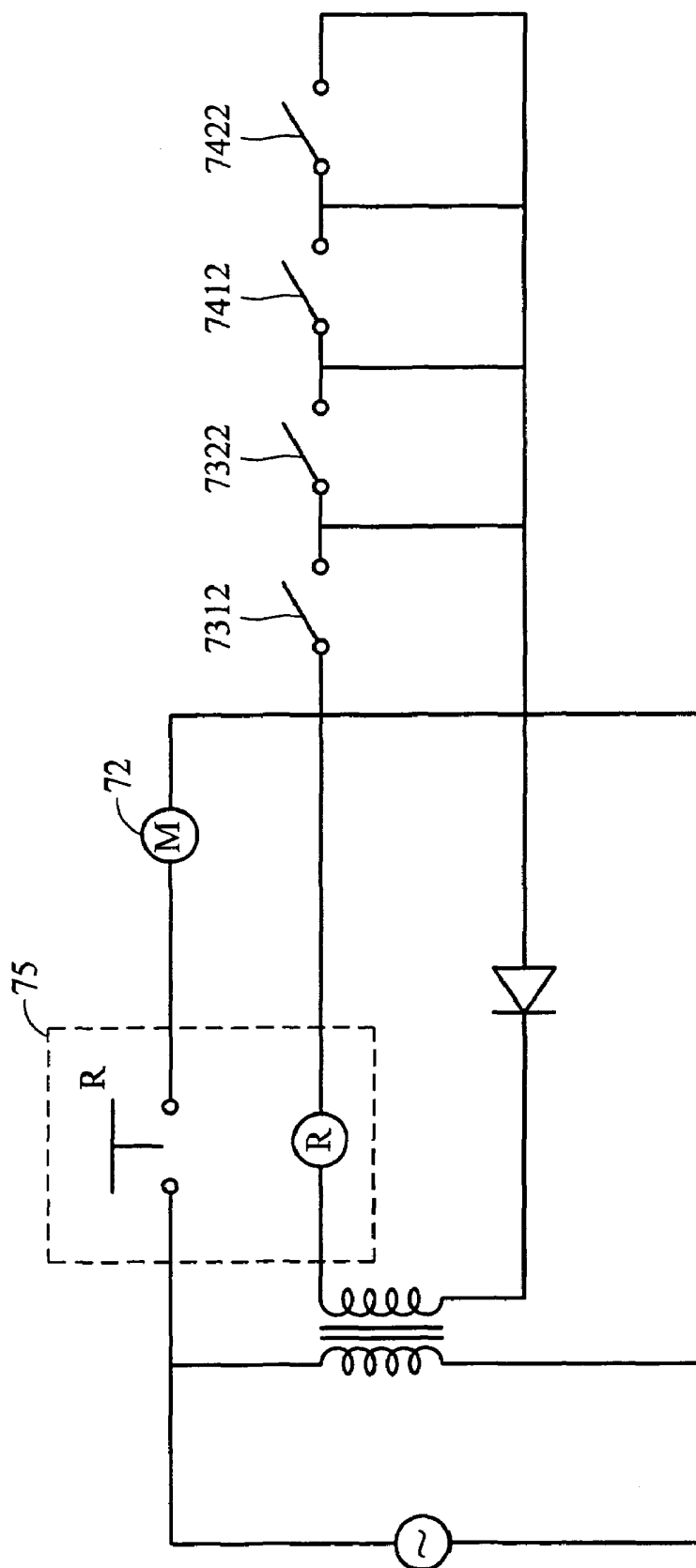


FIG. 7F

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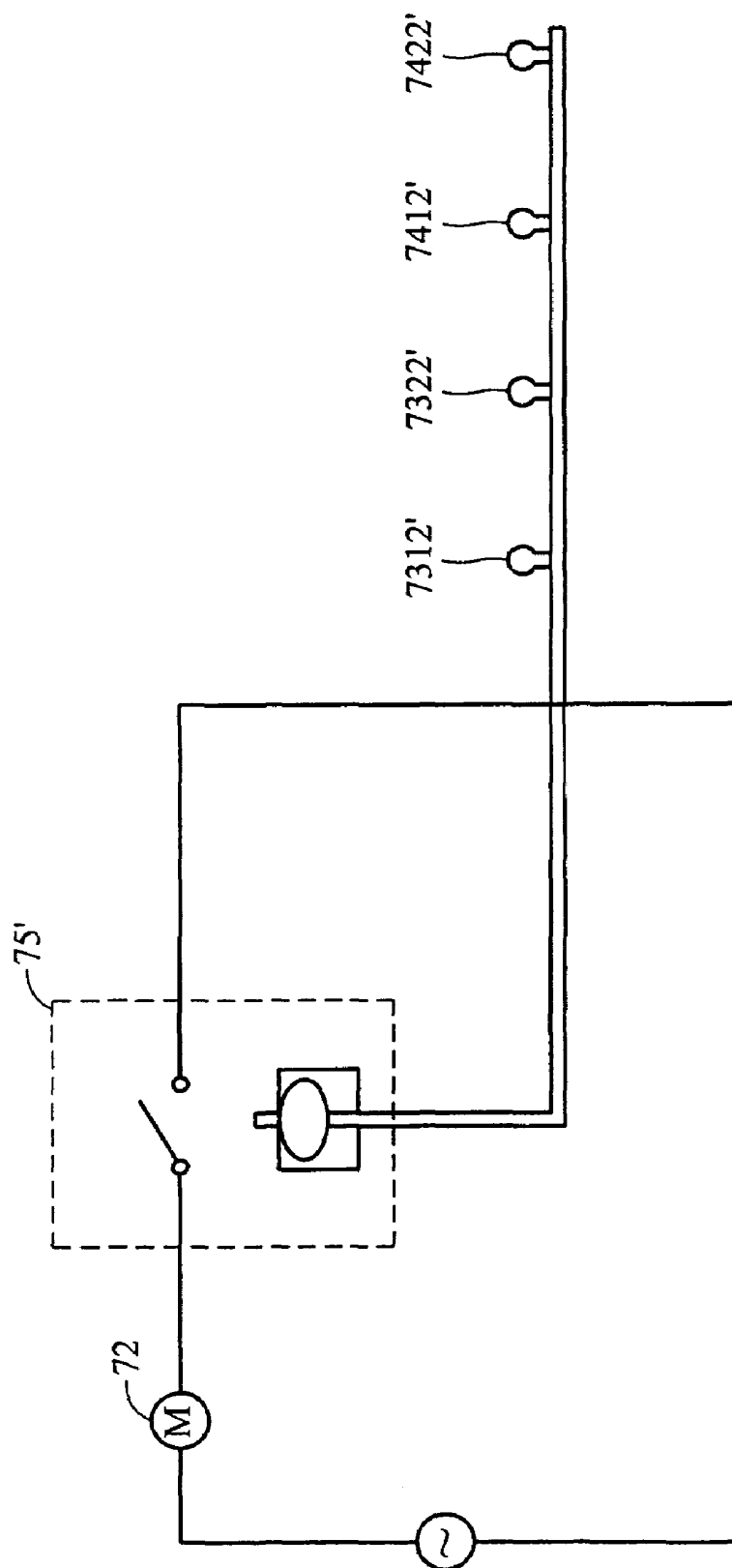


FIG. 7G

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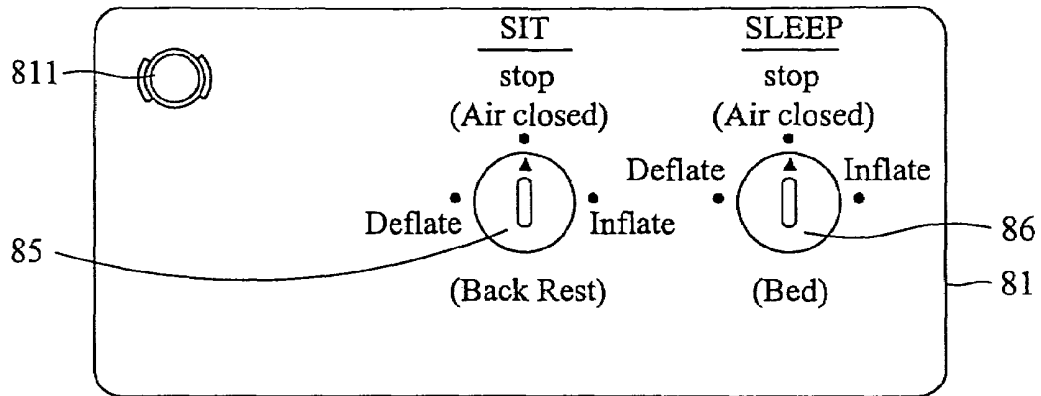


FIG. 8A

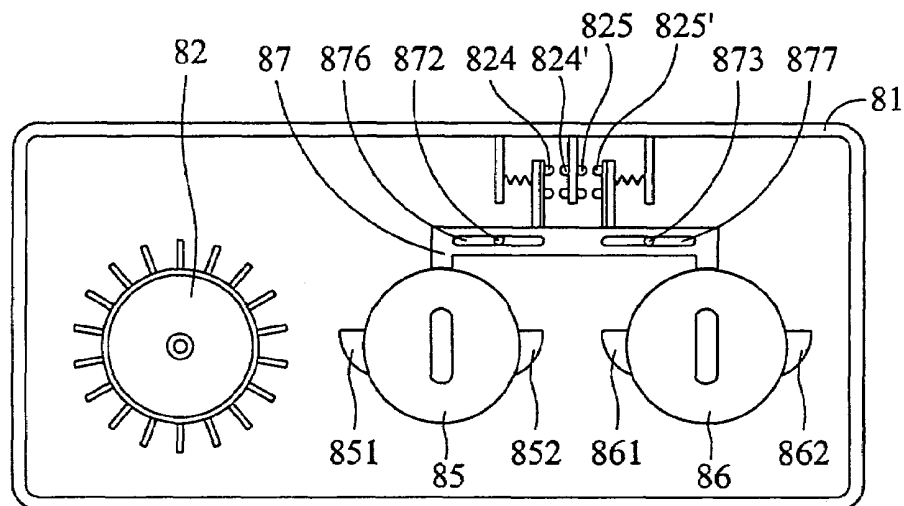


FIG. 8B

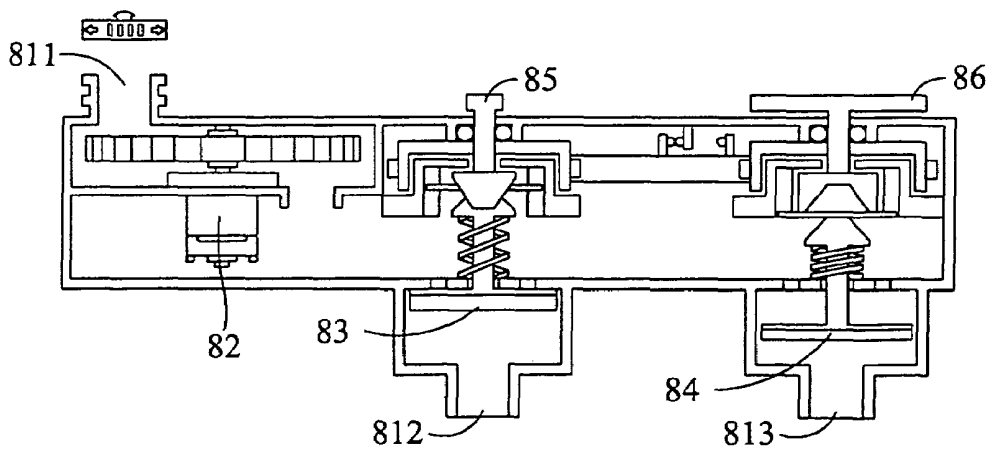


FIG. 8C

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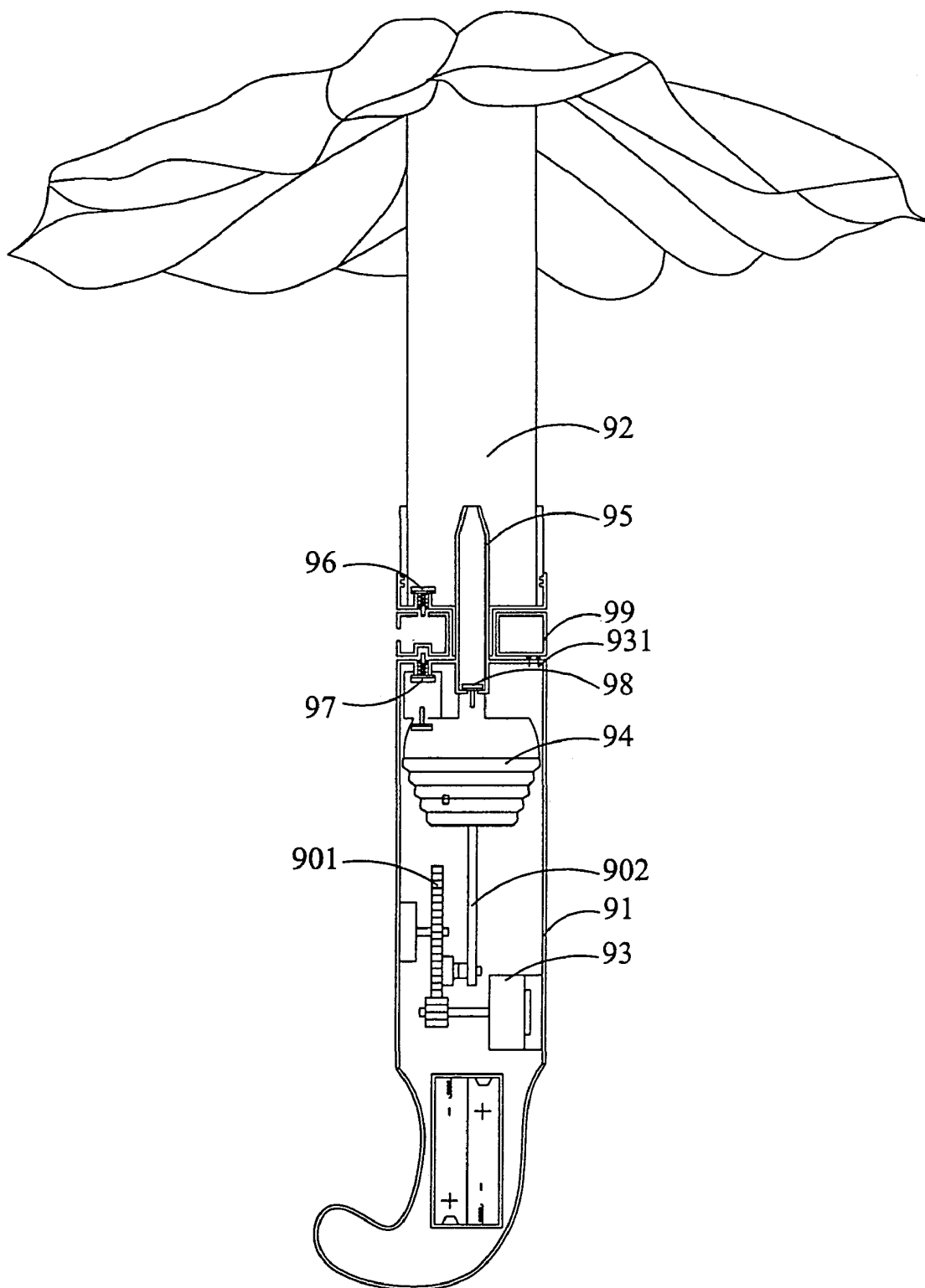


FIG. 9A

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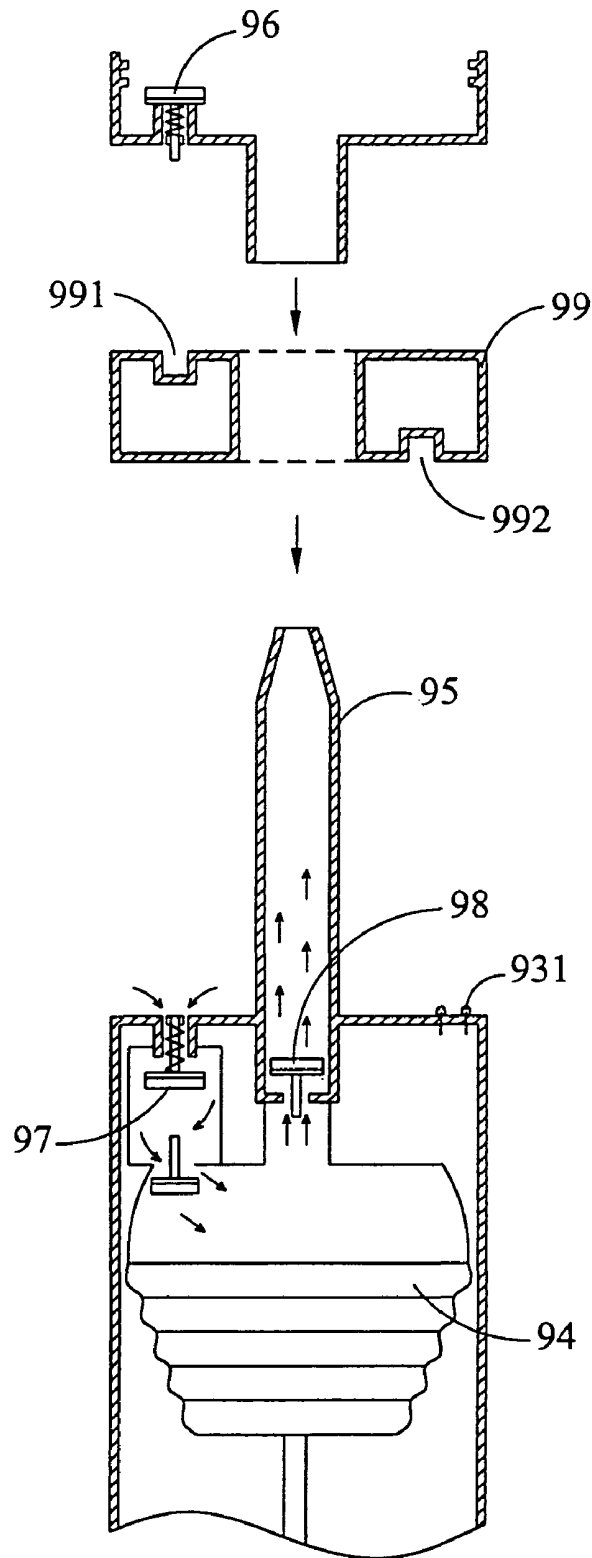


FIG. 9B

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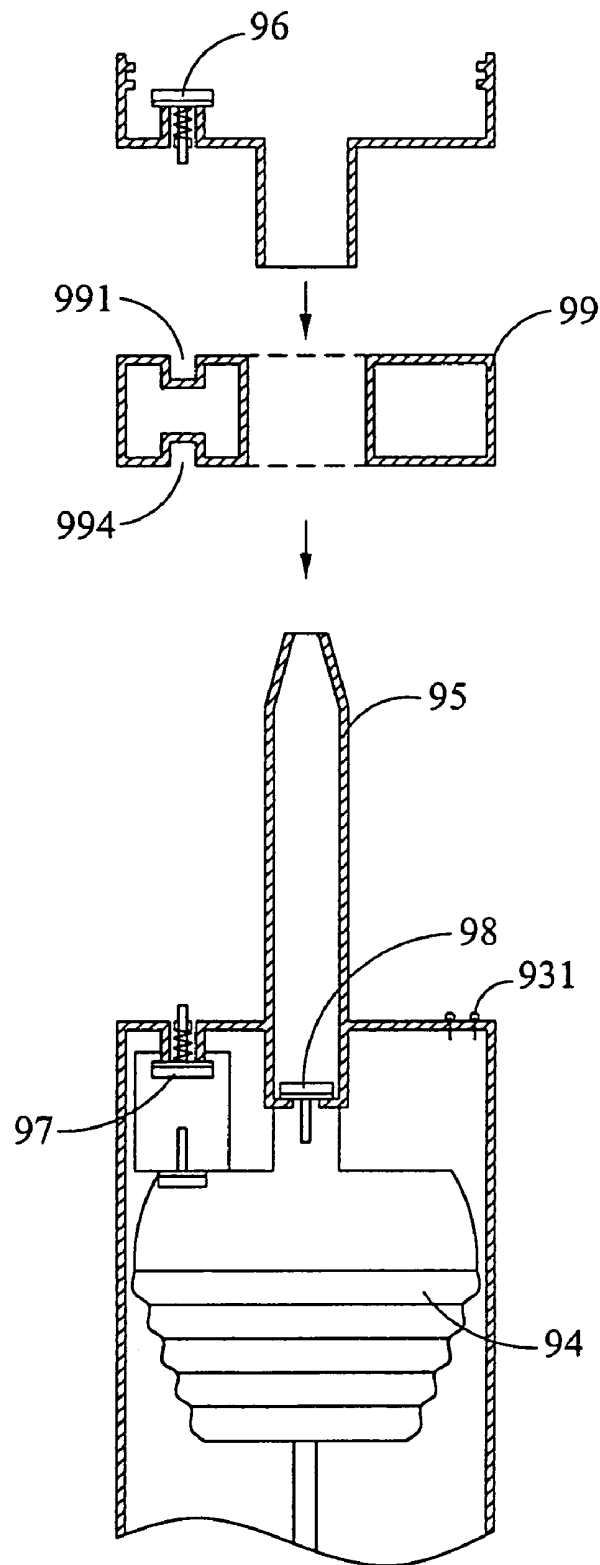


FIG. 9C

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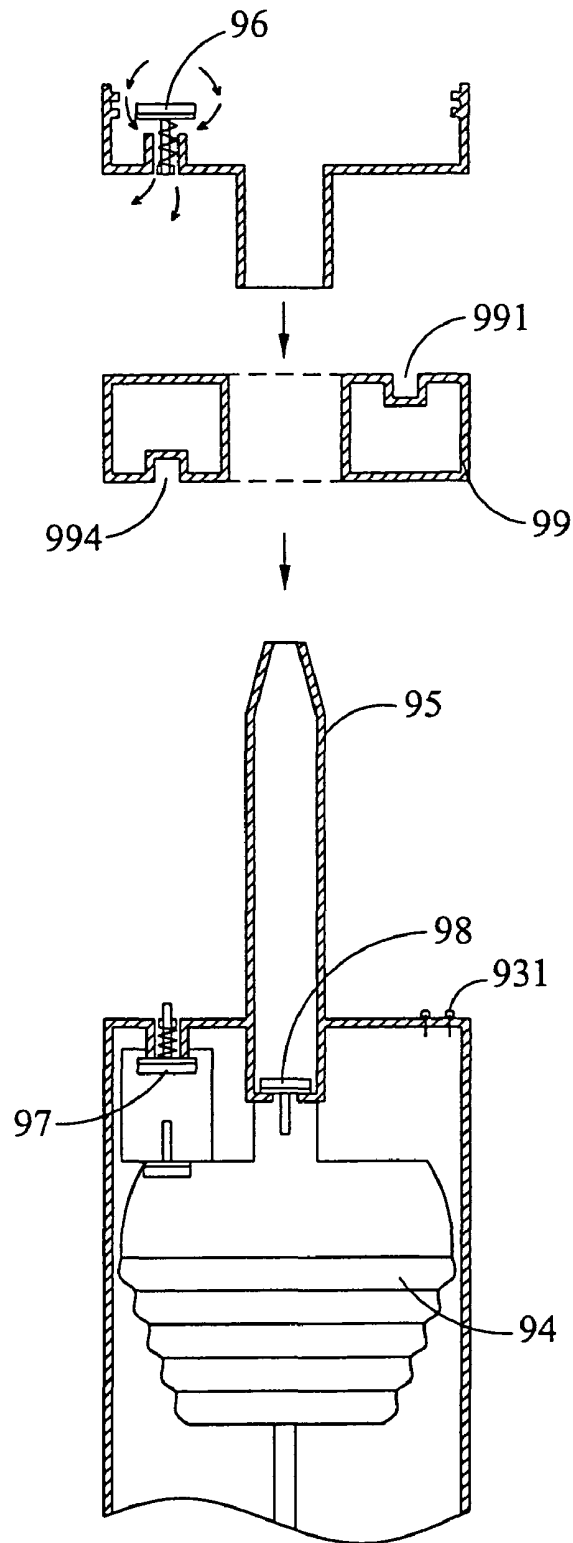


FIG. 9D

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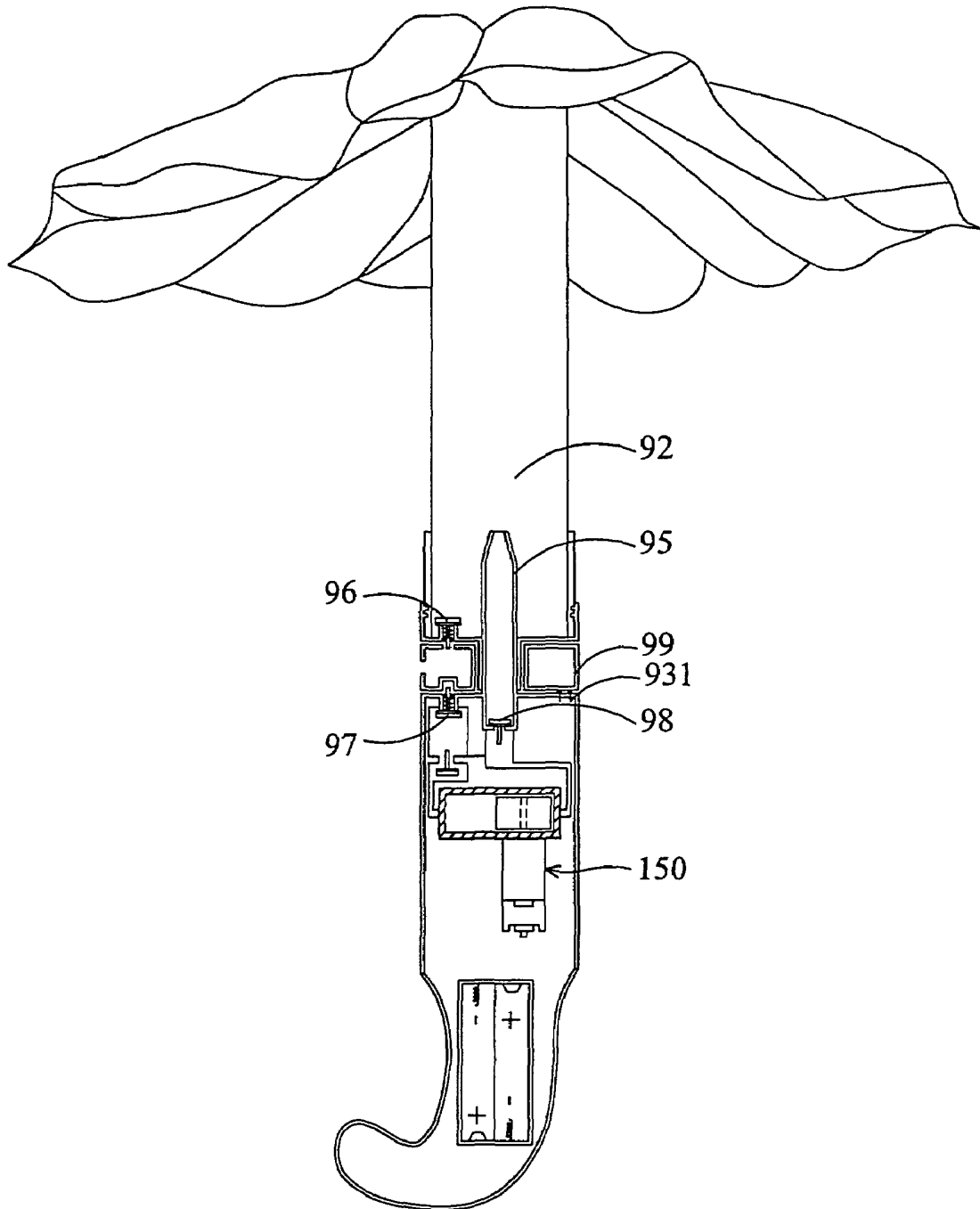


FIG. 10A

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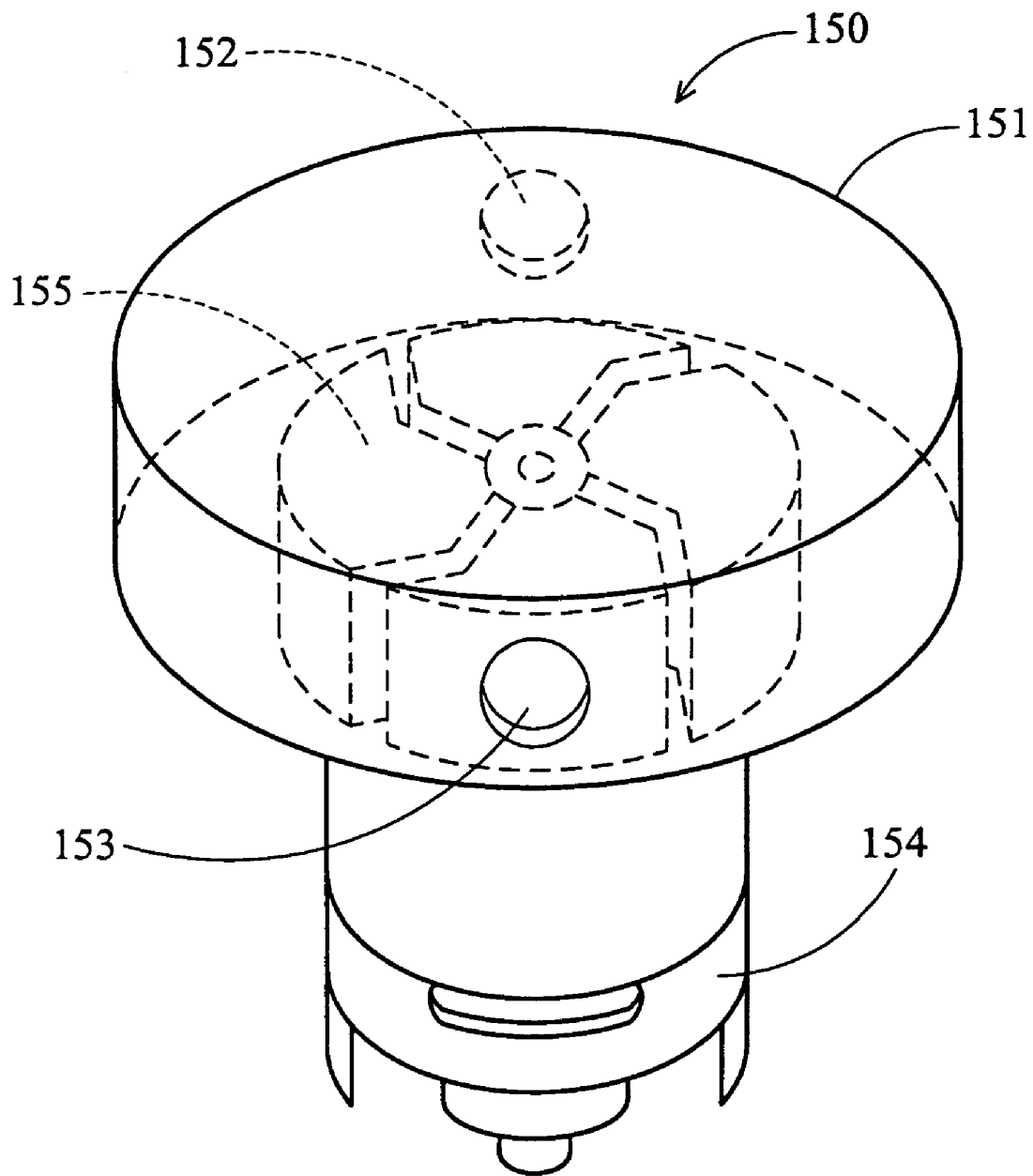


FIG. 10B

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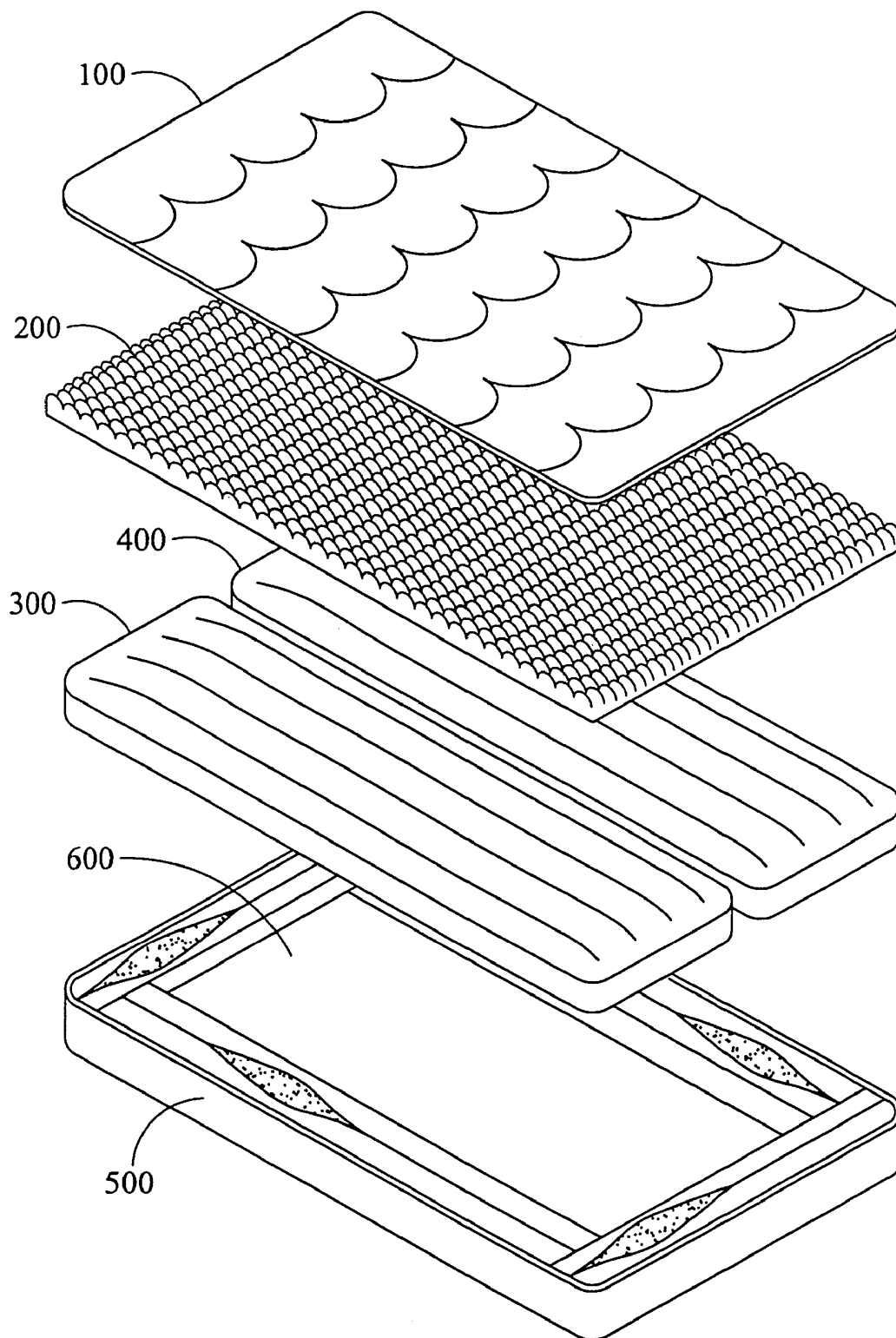


FIG. 11 (PRIOR ART)

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**INFLATABLE PRODUCT WITH BUILT-IN
HOUSING AND SWITCHING PIPE****CROSS-REFERENCE TO RELATED
APPLICATION**

This application is a divisional of U.S. application No. Ser. No. 09/886,030, filed Jun. 22, 2001, now U.S. Pat. No. 6,990,700.

BACKGROUND OF THE INVENTION**1. Field of the Invention**

The present invention relates in general to an inflatable product provided with an electric air pump.

2. Description of the Related Art

Referring to FIG. 11, prior art provides a conventional air mattress for two people with a top fabric cover **100**, a layer of foam **200**, two inflatable chambers **300**, **400**, a frame **500** and a bottom fabric cover **600**. The inflatable chambers **300**, **400** are inflated by an electric air pump (not shown), which is separately provided, requiring users to carry two items, the air mattress itself, and an electric air pump. Inconvenience results, especially for outdoor use.

The present invention provides a modified air mattress, which has a built-in electric air pump eliminating the need for an external pump. Furthermore, operation of the air mattress of the present invention is easy.

SUMMARY OF THE INVENTION

An object of the present invention is to provide an air mattress, easily operated and conveniently carried.

The air mattress of the present invention includes a chamber and an electric air pump for inflating the chamber. The air pump has an air intake and an air outlet. The air intake is connected to the outside of the chamber and the air outlet is connected to the inside of the chamber when the air pump is moved to first position. The air intake is connected to the inside of the chamber and the air outlet is connected to the outside of the chamber when the air pump is moved to second position.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention can be more fully understood by reading the subsequent detailed description and examples with references made to the accompanying drawings, wherein:

FIG. 1A is a perspective diagram of an inflatable product in accordance with a first embodiment of the present invention;

FIG. 1B is an expanded view of the inflatable product of the first embodiment of the present invention;

FIG. 1C is an exploded diagram of the air pump and pump seat of FIG. 1B;

FIG. 1D is a schematic diagram of the air pump of the first embodiment during inflation;

FIG. 1E is a schematic diagram of the air pump of the first embodiment during deflation;

FIG. 2A depicts an air pump of a second embodiment of the present invention during inflation;

FIG. 2B is a sectional view of FIG. 2A along line II-II;

FIG. 2C depicts the air pump of the second embodiment of the present invention during deflation;

FIG. 3A depicts an air pump of a third embodiment of the present invention during inflation;

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FIG. 3B depicts the air pump of FIG. 3A, with a part of the housing removed;

FIG. 3C depicts the air pump of the third embodiment of the present invention during deflation;

FIG. 3D depicts the air pump of FIG. 3C, with a part of the housing removed;

FIG. 4A is a perspective diagram of an inflatable product in accordance with a fourth embodiment of the present invention;

FIG. 4B is an expanded view of FIG. 4A;

FIG. 4C is a sectional view of FIG. 4B along line IV-IV;

FIG. 4D is a schematic diagram of the cam element and bar of the valve switch of the fourth embodiment, where the valve switch is closed;

FIG. 4E is a schematic diagram of the cam element and bar of the valve switch of the fourth embodiment, where the valve switch is opened;

FIG. 4F depicts the air pump assembly of the fourth embodiment during inflation;

FIG. 4G depicts the back support of the air mattress of the fourth embodiment, wherein the back support is filled with air;

FIG. 4H depicts the deflated back support of the air mattress of FIG. 4G;

FIG. 4I depicts a modified example of the back support of the air mattress of the fourth embodiment, wherein the back support is filled with air;

FIG. 4J depicts the deflated back support of the air mattress of FIG. 4I;

FIG. 4K depicts another modified example of the back support of the air mattress of the fourth embodiment, wherein the back support is filled with air;

FIG. 4L depicts the deflated back support of the air mattress of FIG. 4K;

FIG. 4M depicts another modified example of the back support of the air mattress of the fourth embodiment, wherein the back support is filled with air;

FIG. 4N depicts the deflated back support of the air mattress of FIG. 4M;

FIG. 5A is a perspective diagram of an inflatable product in accordance with a fifth embodiment of the present invention;

FIG. 5B is an expanded view of FIG. 5A;

FIG. 5C is a back view of FIG. 5B;

FIG. 6 depicts an inflatable product in accordance with a sixth embodiment of the present invention;

FIG. 7A depicts an inflatable product in accordance with a seventh embodiment of the present invention;

FIG. 7B depicts the first control pack of the inflatable product of FIG. 7A;

FIG. 7C depicts the second control pack of the inflatable product of FIG. 7A;

FIGS. 7D and 7E depict the operation of the switch of the first control pack of FIG. 7B;

FIG. 7F depicts a control circuit for activating the air pump of FIG. 7A;

FIG. 7G depicts a modified control circuit of FIG. 7F;

FIG. 8A is a front view of the operating panel of the air pump assembly in accordance with an eighth embodiment of the present invention;

FIG. 8B is the front view of the air pump assembly of FIG. 8A, with the operating panel removed;

FIG. 8C is a bottom view of FIG. 8C;

FIG. 9A depicts an inflatable product of a ninth embodiment of the present invention;

FIG. 9B is an expanded view of the inflatable product of FIG. 9A, during inflation;

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FIG. 9C is an expanded view of the inflatable product of FIG. 9A, in stop mode;

FIG. 9D is an expanded view of the inflatable product of FIG. 9A, during deflation;

FIG. 10A shows a modified inflatable umbrella of the ninth embodiment of the present invention;

FIG. 10B is a perspective diagram of a fan assembly of FIG. 10A;

FIG. 11 is an exploded perspective diagram of a conventional air mattress.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1A and 1B, an inflatable product of a first embodiment of the present invention has an inflatable chamber 10, a pump seat 11 mounted on the chamber 10, an air pump 12 carried by the pump seat 11, two holding elements 13, 13' to hold the air pump 12, and two covers 14, 14' for covering the vents 131, 131' provided on the holding elements 13. Referring to FIG. 1C, the seat 11 has two holes 111, 112 on its bottom, through which air enters the chamber 10. The air pump 12 has a substantially rolling-pin-shaped housing with a fan and motor (not shown) inside. An air intake 121 and an air outlet 122 are provided at opposite ends of the housing. The housing of the air pump 12 has a rib 123 on its outer surface, wherein the rib 123 extends in the axial direction of the housing. Referring to FIG. 1D, the air pump 12 is carried by the seat 11 with the rib 123 resting on the seat 11. Then, the holding elements 13 are screwed to the seat 11 for holding the air pump 12.

During inflation, the air pump 12 pumps air into the inflatable product. Air flows through the vent 131 of the holding element 13, the air intake 121 and air outlet 122 of the air pump 12, and the hole 112 on the bottom of the seat 11. Air then flows into the inflatable product via the hole 112 on the bottom of the seat 112.

During deflation, the air pump 12 is rotated in direction X until the rib 123 rests on the seat 11 at another side. As shown in FIG. 1E, the air intake 121 faces down and the air outlet 122 faces up so that the air pump 12 can pump air out of the inflatable product. Air flows through the hole 111 of the seat 11, the air intake 121 and air outlet 122 of the air pump 12, and then out from the vent 131' of the holding element 13'.

Referring to FIG. 2A, an inflatable product of a second embodiment of the present invention is provided with a rotatable switch 21, an air pump 22, a piping system 23 and a cover 24. On the top surface of the switch 21, "INFLATE", "STOP" and "DEFLATE" settings appear. The air pump 22 is firmly connected to the switch 21. The air pump 22 thus follows the switch 21's rotation when twisted. Referring to FIG. 2B, the air pump 22 has a substantially rolling-pin-shaped housing 225 with a fan and motor 223 inside. An air intake 221 and an air outlet 222 are provided at opposite ends of the housing. The piping system 23 includes a main pipe 238, two side pipes 236, 237 and a vent 239. The main pipe 238 is connected to the outside via the vent 239 and connected to the air pump 22 in the housing 225 via the side pipes 236, 237. The cover 24 is used to close the vent 239.

During inflation, the switch 21 is rotated to "INFLATE". The air intake 221 is switched to connect the side pipe 236, while the side pipe 237 is closed by the housing 225 of the air pump 22. The air pump 22 pumps air into the inflatable product in accordance with a path as indicated by the arrows. In detail, air flows through the vent 239, main pipe 238, side pipe 236 and air intake 221, and out from the air outlet 222.

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When inflation is finished, the user rotates the switch 21 to "STOP". The air pump 22 stops. Also, the air intake 221 and air outlet 222 are closed by the housing 225 of the air pump 22.

During deflation, the switch 21 is rotated to "DEFLATE". As shown in FIG. 2C, the air outlet 222 is switched to connect the side pipe 237, while the side pipe 236 is closed by the housing 225 of the air pump 22. The air pump 22 evacuates air from the inflatable product in accordance with a path as indicated by arrows. In detail, air flows through the air intake 221, air outlet 222, side pipe 237 and main pipe 238, and out from the vent 239.

Referring to FIGS. 3A and 3B, an inflatable product of a third embodiment of the present invention is provided with a housing 31, a fan and motor 33, a switching pipe 32, a flap 36 and a cover 35. The fan and motor 33 is received in the housing 31. The flap 36 is firmly connected to the switching pipe 32. Therefore, when the switching pipe 32 is rotated, the flap 36 follows. An air intake 311 and an air outlet 312 are provided on the top surface of the housing 31, while another air intake 314 and air outlet 313 are provided on the bottom surface of the housing 31. During inflation, the switching pipe 32 is connected to the air outlet 312 on the top surface of the housing 31. The cover 35 is removed from the air intake 311. The inflatable product (not shown) is inflated by the fan and motor 33. Air flows through the air intake 311 and the air outlet 313, and into the inflatable product.

Referring to FIGS. 3C and 3D, During deflation, the switching pipe 32 is switched from the air outlet 312 to the air intake 311 on the top surface of the housing 31. Also, the flap 36 follows the switching pipe 32 to rotate to close the air outlet 313 on the bottom surface of the housing 31. The air in the inflatable product is evacuated by the fan and motor 33. The path of the airflow is indicated by arrows. Air flows through the air intake 314, the switching pipe 32 and the air intake 311, and into the housing 31. Then, air flows out from the air outlet 312.

Referring to FIG. 4A, an inflatable product of a fourth embodiment of the present invention is an air mattress which includes a mattress pad 41, a back support 42 and an air pump assembly 43 built into the mattress pad 41 to inflate the mattress pad 41 and the back support 42. The back support 42 is inflated to raise the backrest of the mattress pad 41. Referring to FIGS. 4B and 4C, the air pump assembly 43 has a pack 430, a fan and motor 435 received in the pack 430, a motor switch 433 mounted on the pack 430 to activate the fan and motor 435, two valves 436, 436' disposed in the pack 430, and two valve switches 431, 431' for opening/closing the valves 436, 436'. The pack 430 has an air intake 4301, a first air outlet 4302 connected to the back support 42, and a second air outlet 4302' connected to the mattress pad 41. The valve switches 431, 431' have the same structure. Therefore, only the valve switch 431 is introduced and the description of the valve switch 431' is omitted. The valve switch 431 has a cap 4311, a cam element 4312, a bar 4313 and a spring 4314. The cam element 4312 is firmly connected to the cap 4311. When the cap 4311 is twisted, the cam element 4312 follows the cap 4311's rotation. Referring to FIG. 4D, the cam element 4312 has a recess 4314 on its bottom, via which the cam element 4312 sits on the bar 4313.

To inflate the back support 42, the user turns on the motor switch 433 to activate the fan and motor 435. In addition, the user turns on the valve switch 431 by twisting the cap 4311. The cam element 4312 follows the cap 4311's rotation as shown in FIG. 4D. Then, the bar 4313 is depressed by the

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cam element 4312 as shown in FIG. 4E. Referring to FIG. 4F, the spring 4314 is compressed by the bar 4313 and the valve 461 is opened. Then, outside air is pumped into the back support 42 through the air intake 4301 and air outlet 4302 of the air pump assembly 43. Arrows indicate the path of airflow.

If the user further turns on the valve switch 431', then the mattress pad 41 is inflated.

Referring to FIG. 4G, the back support 42 is inflated to raise the backrest of the mattress pad 41. Referring to FIG. 4H, the backrest of the mattress pad 41 is lowered when the back support 42 is deflated. It is noted that the cross section of the back support 42 is V-shaped. By such an arrangement, the mattress pad 41 is flat enough that a user cannot detect the presence of the deflated back support 42.

FIGS. 4I and 4J depict a modified example of the back support of the air mattress, wherein the back support 44 has a flexible chamber 442 of a triangular cross section and an elastic string 441 binding the chamber 442. When the chamber 442 is filled with the air, the elastic string 44 is stretched. When the chamber 442 is deflated, the elastic string 44 automatically contracts to collapse the chamber 442.

FIGS. 4K and 4L depict another modified example of the back support of the air mattress, wherein the back support 46 has a flexible chamber 464, a frame 463 pivoted to the mattress pad 47 and connected to the chamber 464, an elastic string 461 fixed to the frame 463 for binding the chamber 464, and round slider 462 mounted on the bottom of the frame 463. When the chamber 464 is filled with air, the elastic string 461 is stretched. When the chamber 464 is deflated, the elastic string 461 automatically contracts to collapse the chamber 464. Then, the chamber 464 pulls the frame 463. The frame 463 slides on the ground via the round sliders 462 and rotates toward the mattress pad 47 to collapse the chamber 464.

FIGS. 4M and 4N depict another modified example of the back support of the air mattress, wherein the back support 48 has a flexible chamber 481, a first frame 483, a second frame 484 hinged to the first frame 483, and an elastic string 482 fixed to the frames 483, 484 to bind the chamber 481. The flexible chamber 481 is sandwiched between the frames 483, 484. When the chamber 464 is filled with air, the elastic string 461 is stretched and the frames 483, 484 are spread. When the chamber 464 is deflated, the elastic string 461 automatically contracts to collapse the chamber 464. Also, the frames 483, 484 are closed to collapse the chamber 481.

Referring to FIG. 5A, an inflatable product of a fifth embodiment of the present invention includes two inflatable chambers 51, 52, an air pump assembly 53 and a two-way valve device 54. The air pump assembly 43 is used to inflate the chambers 51 and 52 via the two-way valve device 54, wherein the two-way valve device 54 is connected to the chamber 52 via a pipe 55. Also referring to FIGS. 5B and 5C, the air pump assembly 53 has a motor switch 533 and an air intake 531 on its front surface, and an air outlet 532 on its rear surface. The two-way valve device 54 has a valve switch 543 on its front surface, an air intake 541 and an air outlet 542 on its rear surface. During inflation, the user turns on the motor switch 533 to pump air into the chamber 51 through the air intake 531 and air outlet 532. To further inflate the chamber 52, the valve switch 54 is turned on so that air in the chamber 51 flows into the chamber 52 through the two-way valve device 54.

Referring to FIG. 6, an inflatable product of a sixth embodiment of the present invention includes two inflatable chambers 61, 62 and an air pump assembly 63. The air pump

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assembly 63 inflates the chambers 61, 62 via two check valves 64, 65, respectively. The air pump assembly 63 has a fan and motor 633, a valve switch 631 and a cantilever arm 632 connected to the valve switch 631. To inflate the chamber 61, the user twists the valve switch 631 so that the cantilever arm 632' depresses the valve 64. The valve 64 is thus opened. Arrows indicate the path of airflow. Similarly, the user twists the valve switch 631 to open the valve 65 by the cantilever arm 632, when the chamber 62 is inflated.

Referring to FIG. 7A, an inflatable product of a seventh embodiment of the present invention includes four inflatable chambers 711, 712, 713, 714, an air pump 72, a first control pack 73 for controlling the air pump 72 to inflate the chambers 711, 712, and a second control pack 74 for controlling the air pump 72 to inflate the chambers 713, 714. Referring to FIG. 7B, the first control pack 73 has a pack body 730, two switches 731, 732, an air intake 733 connected to the air pump 72 and two air outlets 734, 735 respectively connected to the chambers 712, 711. Referring to FIG. 7C, the second control pack 74 has the same structure as the first control pack 73. The second control pack 74 has a pack body 740, two switches 741, 742, an air intake 743 connected to the air pump 72 and two air outlets 744, 745 respectively connected to the chambers 713, 714. Referring to FIGS. 7D, the switch 731 is connected to a valve 7311 while a micro switch 7312 is provided beside the switch 731. When the switch 731 is rotated to the "INFLATE" position, the valve 7311 is opened and the micro switch 7312 is turned on as shown in FIG. 7E. Other switches 732, 741, 742 have the same structure as the switch 731, thereby having micro switches beside. Further referring to FIG. 7F, when any of the micro switches 7312, 7322, 7412, 7422 is turned on, a relay 75 is activated and turned on. Then, the air pump 72 is supplied with power to inflate the corresponding chambers 711, 712, 713, 714.

FIG. 7G depicts a modified control circuit of FIG. 7F, wherein reference numerals 7312', 7322', 7412', 7422' represent air bulbs instead of micro switches. When any of the air bulbs 7312', 7322', 7412', 7422' is pressed, a pressure switch 75' is turned on. Then, the air pump 72 is supplied with power to inflate the corresponding chambers 711, 712, 713, 714.

FIGS. 8A, 8B and 8C show an air pump assembly in accordance with an eighth embodiment of the present invention, wherein FIG. 8A is the front view of the operating panel of the air pump assembly, FIG. 8B is the front view of the air pump with the operating panel removed, and FIG. 8D is a bottom view of FIG. 8C. The air pump assembly includes a pack 81 with a vent 811 on its top and two vents 812, 813 on its bottom, a fan and motor 82 received in the pack 81, two valves 83, 84 for opening/closing the vents 812 and 813, two switches 85, 86 and an elongated slider 87 provided beside the switches 85, 86. The elongated slider 87 has two slots 876, 877 with pins 872, 873 received inside, while the pins 872, 873 are firmly fixed in the pack 81. By the arrangement, the slider 87 is slideable with respect to the pins 872, 873. Furthermore, the fan and motor 82 have two pairs of electrodes 824, 824' and 825, 825'. The electrodes 824, 825' are fixed to the pack 81, while the electrodes 824, 825' are firmly connected to the slider 87. When the slider 87 is moved to the right, the pair of electrodes 824, 824' physically contact each other. Then, the fan and motor 82 is activated to rotate in a normal direction. When the slider 87 is moved to the left, the pair of electrodes 825, 825' physically contact each other. Then, the fan and motor 82 is activated to rotate in a reverse direction. Furthermore, the

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switches **85**, **86** have ears **851**, **852**, **861**, **862** to push the slider **87** in different directions.

During inflation, the switch **85**, for example, is rotated to "INFLATE". The valve **83** connected to the switch **85** is opened. Meanwhile, the ear **851** of the switch **85** pushes against the slider **87** so that the pair of electrodes **824**, **824'** physically contact each other. Thus, the fan and motor **82** is activated to pump air from the top vent **811** to the bottom vent **812**. When the switch **85** is rotated to "DEFLATE", the valve **83** is opened. The ear **852** of the switch **85** pushes against the lever **871** so that the pair of electrodes **825**, **825'** contact each other and the pair of electrodes **824**, **824'** separate. Then, the fan and motor **82** operates in reverse to pump air from the bottom vent **812** to the top vent **811**. Similarly, air is pumped from the top vent **811** to the bottom vent **813** when the switch **86** is rotated to "INFLATE". On the other hand, air is pumped from the bottom vent **813** to the top vent **811** when the switch **86** is rotated to "DEFLATE".

Referring to FIG. 9A, an inflatable product of a ninth embodiment of the present invention is an umbrella. The umbrella has a stiff handle **91** and an inflatable (flexible) shank **92**. An air pump is arranged in the handle **91** to pump the inflatable shank **92**. The air pump has a nozzle **95**, bellows **94** for supplying the shank **92** with air via the nozzle **95**, and a motor **93** for operating the bellows **94** via gears **901** and a link **902**. Furthermore, a ring switch **99** is provided around the handle **91** to activate the motor **93**. In addition, three check valves **96**, **97**, **98** are provided to control the airflow. The first check valve **97** for controlling the entrance of air into the bellows **94** is provided under the ring switch **99**. The second check valve **96** for controlling the exit of air from the inflatable shank **92** is provided over the ring switch **99**. The third check valve **98** is provided between the bellows **94** and the nozzle **95** for controlling the airflow from the bellows **94** to the shank **92**.

On the top and bottom of the ring switch **99** are provided a plurality of recesses. Referring to FIG. 9B, During inflation, the ring switch **99** is rotated to such a position that a top recess **991** of the ring switch **99** is positioned under the check valve **96**, allowing the check valve **96** to be closed. Meanwhile, the check valve **97** is opened by the bottom of the ring switch **99**. Also, a bottom recess **992** of the ring switch **99** is positioned over the button **931** of the motor **93** to release the button **931**. Then, the motor **93** operates the bellows **94** via the gears **901** and link **902**. Outside air is pumped into the shank **92** through the check valves **97**, **98**. The path of airflow is indicated by arrows.

To stop the inflating operation, the user rotates the ring switch **99** to the position shown in FIG. 9C, wherein the top recess **991** of the ring switch **99** is still positioned under the check valve **96** so that the check valve **96** is closed. Another bottom recess **994** of the ring switch **99** is positioned over the check valve **97** so that the check valve **97** is closed. Also, the bottom of the ring switch **99** pushes the button **931** to stop the motor **93**.

To deflate the umbrella, the user rotates the ring switch **99** to the position shown in FIG. 9D, wherein the bottom recess **994** of the ring switch **99** is still positioned over the check valve **97** so that the check valve **97** is closed. The bottom of the ring switch **99** continues pushing the button **931** so that the motor **93** is still at rest. The top of the ring switch **99** pushes the check valve **96** so that the check valve **96** is opened. Then, air in the shank **92** of the umbrella automatically flows out through the check valve **96**.

FIGS. 10A and 10B show a modified inflatable umbrella, wherein the air pump of the ninth embodiment including the

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bellows **94**, link **902**, gears **901** and motor **93** are replaced with another kind of air pump **150**. The air pump **150** includes a cylindrical reservoir **151**, a fan (air pressure rotator) **155** eccentrically received in the reservoir **151**, and a motor **154** provided outside the reservoir **151** to rotate the fan **155**. The reservoir **151** has an air intake **152** connected to the first check valve **97** and an air outlet **153** connected to the third check valve **98**. During operation, air is pumped into the reservoir **151** through the air intake **152** and then pumped out through the air outlet **153**. Furthermore, it is noted that the fan **155** is eccentrically arranged in the reservoir **151**. This fan assembly generates sufficient air pressure to inflate the umbrella.

While the invention has been described by way of example and in terms of the preferred embodiment, it is to be understood that the invention is not limited to the disclosed embodiments. To the contrary, it is intended to cover various modifications and similar arrangements (as would be apparent to those skilled in the art). Therefore, the scope of the appended claims should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.

What is claimed is:

1. An inflatable product including:

an inflatable body;

a fan and motor assembly for pumping air;

a housing built into the inflatable body, the housing having an interior region; and

an air conduit disposed at least in part in the housing, the air conduit being movable between a first position and a second position while remaining disposed at least in part in the housing, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;

wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation.

2. The inflatable product as claimed in claim 1, wherein air flows from the interior region of the housing into the inflatable body when the air conduit is in the first position.

3. The inflatable product as claimed in claim 1, wherein air flows from the inflatable body into the interior region of the housing when the air conduit is moved to the second position.

4. The inflatable product as claimed in claim 1, wherein the air conduit is a pipe.

5. The inflatable product as claimed in claim 4, wherein the pipe is rotatable.

6. The inflatable product as claimed in claim 4, wherein the pipe is a switching pipe.

7. The inflatable product as claimed in claim 1, wherein the air conduit is arranged to convey air pumped by the fan and motor assembly.

8. The inflatable product as claimed in claim 7, wherein the air conduit has a first end and a second end, and wherein the fan and motor assembly causes air to be conveyed from the first end of the air conduit to the second end of the air conduit when the air conduit is in the first position.

9. The inflatable product as claimed in claim 8, wherein the fan and motor assembly causes air to be conveyed in sequence from ambient, through the first end of the air conduit, to the second end of the air conduit, and into the inflatable body when the air conduit is in the first position.

10. The inflatable product as claimed in claim 8, wherein the fan and motor assembly causes air to be conveyed from

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the second end of the air conduit to the first end of the air conduit when the air conduit is in the second position.

11. The inflatable product as claimed in claim 10, wherein the fan and motor assembly causes air to be conveyed in sequence from the inflatable body, through the second end of the air conduit, to the first end of the air conduit, to ambient when the air conduit is in the second position.

12. The inflatable product as claimed in claim 1, wherein the fan and motor are received in the housing.

13. An inflatable product including:

an inflatable body;

a housing built into the inflatable body, having a first opening and a second opening;

a fan and motor for pumping air; and

a switching pipe disposed at least in part in the housing and having a first end and a second end, the switching pipe movable between a first position and a second position, the switching pipe arranged such that the first end of the switching pipe communicates with the first opening when the switching pipe is in the first position, and the first end of the switching pipe communicates with the second opening when the switching pipe is in the second position; wherein, on activation of the fan, air is pumped in sequence from the second opening to the first opening and through the switching pipe from the first end to the second end when the switching pipe is in a first position, and air is pumped is pumped in sequence from the second end to the first end of the switching pipe and through the second opening to the first opening when the switching pipe is in the second position.

14. The inflatable product as claimed in claim 13, wherein the housing comprises an interior region, and air flows between the interior region of the housing and the inflatable body when the inflatable body is inflated and deflated.

15. The air pump assembly recited in claim 13, wherein the fan and motor are received in the housing.

16. An inflatable product including:

an inflatable body;

a fan and motor assembly for pumping air;

a housing built into the inflatable body, the housing having an interior region; and

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an air conduit having a first end and a second end, the air conduit disposed at least in part in the housing and arranged to convey air pumped by the fan and motor assembly, the air conduit being movable between a first position and a second position, the fan and motor inflating the inflatable body when the air conduit is in the first position, and deflating the inflatable body when the air conduit is in the second position;

wherein air flows between the interior region of the housing and the inflatable body during inflation and deflation, and

wherein the fan and motor assembly causes air to be conveyed from the first end of the air conduit to the second end of the air conduit when the air conduit is in the first position, and the fan and motor assembly causes air to be conveyed in sequence from the inflatable body, through the second end of the air conduit, to the first end of the air conduit, to ambient when the air conduit is in the second position.

17. The inflatable product as claimed in claim 16, wherein air flows from the interior region of the housing into the inflatable body when the air conduit is in the first position.

18. The inflatable product as claimed in claim 16, wherein air flows from the inflatable body into the interior region of the housing when the air conduit is moved to the second position.

19. The inflatable product as claimed in claim 16, wherein the air conduit is a pipe.

20. The inflatable product as claimed in claim 19, wherein the pipe is rotatable.

21. The inflatable product as claimed in claim 19, wherein the pipe is a switching pipe.

22. The inflatable product as claimed in claim 16, wherein the fan and motor assembly causes air to be conveyed in sequence from ambient, through the first end of the air conduit, to the second end of the air conduit, and into the inflatable body when the air conduit is in the first position.

23. The inflatable product as claimed in claim 16, wherein the fan and motor are received in the housing.

* * * * *

CERTIFICATE OF COMPLIANCE

Pursuant to FED. R. APP. P. 32(g), I certify that this brief complies with the type-volume limitation of FED. R. APP. P. 32(a)(7)(B) and FED. CIR. R. 32(a). The brief contains 8,947 words, excluding the parts of the brief exempted by FED. R. APP. P. 32(f) and FED. CIR. R. 32(b), as calculated by Microsoft Word 2010, the word processing system used in its preparation.

I further certify that this brief complies with the typeface requirements of FED. R. APP. P. 32(a)(5) and the type style requirements of FED. R. APP. P. 32(a)(6). This brief has been prepared in a proportionally spaced typeface using Microsoft Word 2010 in 14 Point Times New Roman font.

Date: April 29, 2022

/s/ Bethany N. Mihalik
Bethany N. Mihalik

FORM 31. Certificate of Confidential Material

Form 31
July 2020

**UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT**

CERTIFICATE OF CONFIDENTIAL MATERIAL

Case Number: 20-1141, 20-1142, 20-1143, 20-1149, 20-1150, 20-1151

Short Case Caption: Intex Recreation Corp. v. Team Worldwide Corporation

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